GEOGRAPHIEDIDAKTISCHE FORSCHUNGEN

Volume 42

Sibylle Reinfried, Yvonne Schleicher, Armin Rempfler (Editors)

Geographical Views on Education for Sustainable Development

Proceedings

Lucerne-Symposium, Switzerland
July 29-31, 2007

**IGU
UGI**

International Geographical Union Commission on Geographical Education

Co-organized by the
Teacher Training University of Central Switzerland Lucerne

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Symposium Session: Outdoor Education and ESD

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Symposium Session:
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Symposium Session:
People, Place, Values and Meaningful Learning

Symposium Session:
Technology and ESD

Symposium Session:
Attitudes and Preconceptions

Symposium Session: Intercultural Dialogue on Educational Approaches to Sustainability (IDEAS) – Project Report

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Declaration

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- Schweizerischer Nationalfonds Nationales Forschungsprogramm NFP 48 Landschaften und Lebensräume der Alpen, www.nfp48.ch

Preface

Sibylle Reinfried, Yvonne Schleicher and Armin Rempfler

Geographical Views On Education For Sustainable Development was the theme of the Symposium of the International Geographical Union Commission on Geographical Education (IGU CGE) in Lucerne, Switzerland in 2007, hosted by the Teacher Training University of Central Switzerland, Lucerne (PHZ Luzern). The theme of the Symposium is related to the United Nations' Decade for Sustainable Development 2005-2014 (UNDESD), whose goal is "to ensure steady improvement in the quality of live for this and future generations, in a way that respects our common heritage - the planet we live on". Nearly all action themes of the UNDESD, i.e. environment, water, rural development, sustainable consumption, sustainable tourism, intercultural understanding, cultural diversity, climate change, disaster reduction, biodiversity and market economy, have a geographical dimension and are therefore of great importance in Geographical Education. The Symposiums' purpose was to stimulate discussions of what geography can contribute to the education for sustainable development (ESD) by research, education, professional development and best-practice accomplishments and how new strategies concerning ESD can be implemented in schools.

Delegates from a wide range of countries met in Lucerne. Their research papers were grouped around one of the following sub-themes that reflect geographical views on education for sustainable development:

- Epistemology and ESD
- People, Place, Values and Meaningful Learning
- Attitudes and Preconceptions
- Sustainable Behavior
- ESD in Curriculum and Teacher Training
- Outdoor Education and ESD
- Technology and ESD
- Best practice
- Intercultural Dialogue on Educational Approaches to Sustainability (IDEAS) – A Project Report

This volume is a selection of the papers presented at the symposium. We hope that they will help to disseminate the various perspectives to a wider audience of geography educators. Through sharing these ideas, we strengthen the pivotal position of geography in the education for sustainable

development in the present and the future and thus contribute to the vibrant and vital future of Geographical Education.

This volume also includes the *Lucerne Declaration on Geographical Education for Sustainable Development,* drafted by the Professors Hartwig Haubrich, Sibyllle Reinfried and Yvonne Schleicher, proclaimed at the Symposium and signed by the present chair of the IGU CGE, Professor Lex Chalmers, on July 31st, 2007. The declaration recommends principles and practices on which effective ESD in Geographical Education should be based. The *Lucerne Declaration* can be seen as an attempt to reach a plateau of consensus and cooperation concerning ESD in Geographical Education among the commission members of the IGU CGE and our delegates from all over the world. We hope that the General Assembly of the International Geographical Union will endorse the *Lucerne Declaration* at the 31st International Geographical Congress in Tunis in 2008 and recommend it to the UNESCO.

The editors would like to thank the authors, reviewers, publisher, sponsors and others involved in the planning and production of this volume. It has been a delight to work with such innovative and professional educators. Finally, let us express our hope that you will find this volume useful and will enjoy reading it.

Lucerne and Weingarten, September 2007

Cultural Evolution And The Concept Of Sustainable Development: From Global To Local Scale And Back

Peter Baccini (Zurich)

Evolution of life is a scientific concept, mainly based on biological findings. The notion "sustainable development" stands for a social contract in construction. Social contracts are a part of the cultural evolution. On a global scale there is neither a dominant model on the origin and destination of life, due to the diversity of religious beliefs, nor a broad agreement on the concrete contents of a contract on sustainability, due to the variety of culture and economy. In the 20th century two new phenomena have risen in the process of cultural evolution: the environmental consciousness and a new type of urbanization. The normative concept of a sustainable development is a consequence of the two. Any work on the social contract named "sustainable development" depends on the understanding of these two phenomena. Environmental protection, based on the results of environmental research, still operates with the paradigm of the two spheres, namely the anthroposphere, where urbanization takes place, and the geosphere, where nature develops without man-made disturbances. Urbanization is driven by socio-economical processes, in which the political design of the boundary conditions is crucial. Sustainable Development is not just an upshot of environmental protection. It asks for a new paradigm in designing the anthroposphere. This hypothesis is illustrated with resource management systems on global, regional and local scales and the interdependences between them.

Keywords: Sustainable Development, Environmental Protection, Urbanization, Regional Resource Management

1. Urbanization of the earth

Cities are, according to anthropological and archaeological findings, inventions of the agrarian societies. The transfer from nomadic groups to settled tribes led to new social systems. It was a change from small egalitarian groups to larger social entities with hierarchical socio-economic relations. In analogy to the structure of natural ecosystems: About 80-90% of the people within a regional agrarian society were in the role of "primary producers". They were controlled and protected by 10-20% of the population, by political, economical and military leaders, surrounded by their religious, administrative and technical staff. The primary producers had to elaborate a surplus of food and biomass to support the secondary and tertiary level. It was a cultural form of symbiosis. The "Polis" as a social concept and as a morphological manifestation within the landscape was invented. It started, according to the hypothesis of archaeologists, in different continents and different cultures on this globe, most likely independent from each other, 6000 - 8000 years before present.

From a physiological point of view the rate-determining step of the growth of cities (meaning primarily the growth in population) was their acquisition of the necessary agrarian "Hinterland". The city of Rome for example, in its climax the center of the world power of the western Antiquity, had to develop a logistic master plan to feed daily approx. 1 Million inhabitants, based mainly on relatively small vehicles and an average transport velocity of less than 5km/h. In the first half of the 19th century, cities were still perceived in the old paradigm of the feudal hierarchy. An impressing illustration for this is Thünen's model of the "City State" (after Thünen 1826). It is mainly an economic model of the city that is "driven by solar energy". The consequent spatial arrangement is the radial concentric pattern of the primary and

secondary producers of goods with the city in its center (Thünen's circles). The urban people lived within the walls, the rural people outside of them. In contemporary terms the agrarian culture was a "solar system" and, in principle, a sustainable one.

From an archaeological point of view the rise of the cities in the large river valleys (e.g. Euphrat/Tigris, Nile, Indus) fell together with the innovation of agricultural, transport and metallurgical technologies (e.g. grain production, sailing boats, bronze), of astronomical calendars and geographical maps (time management and navigation) and of the script (data management and communication). It may be postulated that this combination of innovations in the early urbanization was not the outcome of a genial planner. It was a cultural process, within an adequate environment. Selective social mechanisms, based on trial and error, led eventually to robust advantages in human life for a few or for many inhabitants. This value added could be forwarded to the next generations. Therefore urban life comprises the capacity to mediate the essentials of a culture in symbolic figures and in human forms (after Mumford 1961) in the most concentrated way. Urban life was and is still the morphological and physiological manifestation of the emancipation of humans from the dependence of their natural environment.

2. The 20th century and the emergence of a concept named "sustainable development"

In the 20th century a fundamental and dramatic change occurred in the urban development. The large scale exploitation of fossil energy and the technical inventions and innovations in the transport infrastructure (railways, electrical engineering, individual road vehicles with combustion engines, large vehicles in air transport, electronic telecommunication) allowed on one hand a rapid liberation from the limits of renewable biomass and on the other hand a high exchange rate of people and goods over large distances. This innovation started in Europe and in North America. At the beginning of the 21st century it seems that it is to be copied on a global scale. According to demographic forecasts it is most probable that, by the middle of this century, 80% of the world's population (or approximately 7 to 8 billion inhabitants) will live in an urban environment (Fig.1). The present urban culture is based mainly on "fossil fuels". This is a dramatic change in the evolution of human settlement within three to four generations. In the time frame of the 21st century urbanization is a global project. In the second half of the 20th century two new social and political phenomena appeared, mainly in developed countries, namely (1) an ecological consciousness on local, regional and global scale and (2) a new urbanity.

2.1 From environmental protection to sustainable development

Books like "The Silent Spring" (Carson) and "The Limits to Growth" by the Club of Rome (Meadows et al. 1972) are two among various key publications between 1960 and 1975 that stimulated the awareness of environmental problems in a broad public and led eventually to environmental protections measures, based on new laws. These laws were installed in most developed countries between 1970 and 1990. In the same period a new scientific community arose that focused on "environmental research".
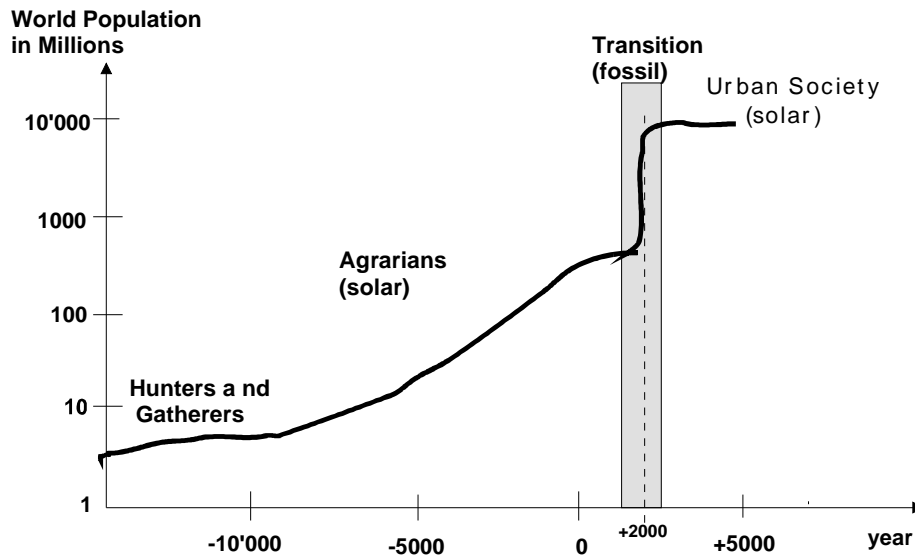
Figure 1: Growth of world population in function of time
It is assumed that the population can be stabilized at a level of about 10 billion people at the end of the 21st century

After two decades the scientific debate came to the conclusion that "environmental problems" are anthropogenic changes in nature that are rated negatively (Hirsch 1995). In this context the concepts of natural sciences with regard to ecological processes are dominant. The main target of "environmental protection" is to sustain the quality of aquatic and terrestrial ecosystems and the climate by limiting the emissions from the anthroposphere to the biosphere and to the geosphere (Fig. 2). "Sustainability norms" are limited to an ecosystem, e.g. a lake, a forest, the soil, the ocean, the atmosphere. From a strictly scientific point of view it is to emphasize that these norms, derived from field studies on local and regional scales, are applicable on a global scale. If one, for example, understands the principal physiological processes that govern the trophic state of a lake, one can apply these findings to any lake on the earth.

The political debate on "sustainable development" started in the eighties of the last century (WECD 1987) and its first summary was presented at the UN conference in Rio de Janeiro in 1992. There is a very distinct difference between "environmental protection" and "sustainable development". Sustainable development (SD) describes global change that is rated positively in the broadest sense (Hirsch 1995). Here the concepts of the social sciences are dominant. The target of SD is an aggregated norm for the whole living space, including all spheres (Fig, 2) and all scales (local, regional, and global). In political practice however SD is a strategy that leads to diverse norms depending on the social, economical and ecological idiosyncrasies of regions.
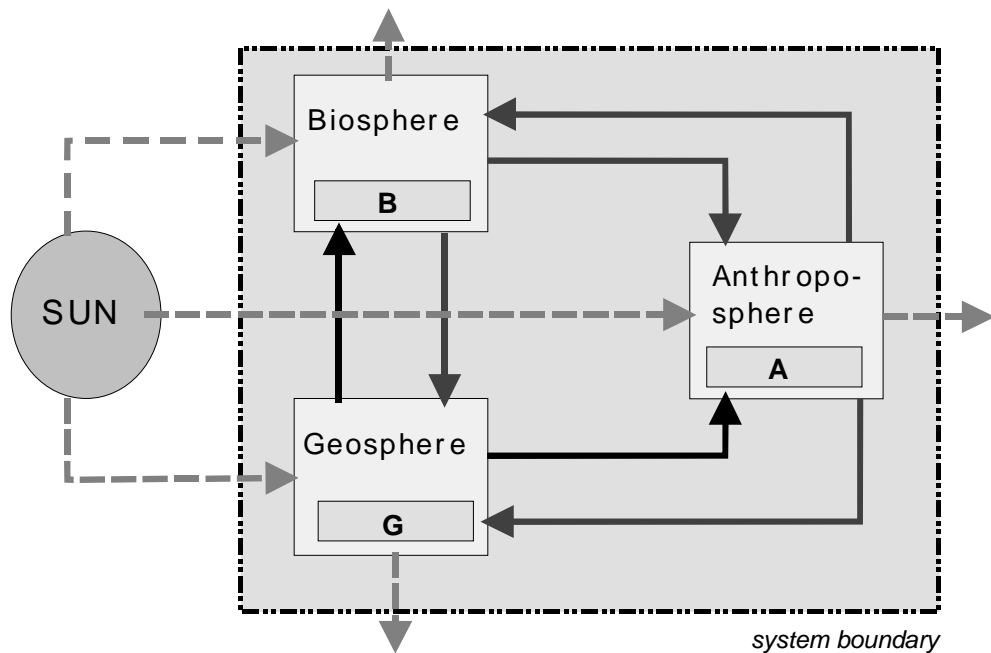
Figure 2: Scheme of main physiological processes of planet earth. The dashed lines indicate energy flows, the letters A,B, G indicate the stocks

2.2 The new urbanity and its consequences for sustainable development

In the 20th century urbanization led to a "dilution" of urban settlement from a dense centre into a network, with a high variety of nodes and connections (Baccini and Oswald 1998). The distinct separation of rural and urban segments within a cultural landscape disappeared. The once concentric and regional "Hinterland" diffused into a global set of "Hinterlands". This new form of urbanity started regionally within the culture of Europe (in the 17th century in the Netherlands), and had the greatest expansion in North America, beginning in the 20th century. Today the great majority of the population of these regions lives an urban life in settlements outside of the classical centers of the 19th century. Urbanity is defined by the access to all relevant goods and services a city can offer, within half an hour travel time (be it by foot, private or public transport vehicle). Therefore the term "urban system" is defined as follows (Oswald and Baccini 2003):

An urban system is composed of open geogenic and anthropogenic networks that are connected with each other. The nodes of these networks are places of high densities of people, physical goods (geogenic included) and information. These nodes are connected by fluxes of people, goods and information. The system's boundary is given by political conventions in the case of anthropogenic subsystems, by climatic properties for geogenic subsystems.

With regard to the resources demand to run urban systems, the focus is laid on the main physical resources. It is self-understood that the general term "resources" includes also non-physical resources. The urban system's physical resource management is characterized with a material management system. Material management systems are investigated and evaluated with the method called material flux analysis [Baccini and Brunner 1991, Baccini and Bader

1996]. These systems consist of discrete processes connected with flows of 'goods' as carriers of matter and energy. The mathematics to describe such a system is based on the balance equations for the "processes", treated as discrete volumes for which the principle of matter and energy conservation holds (Baccini and Bader 1996). The subsequent modeling uses specific parameters to define certain process properties (e.g. transfer coefficients). Such systems can be handled in various states regarding their time dependence. The simplest one is the steady-state situation. The most complicated are those systems in which stocks, flows and transfer coefficients are time dependent. Furthermore one has to consider feedback mechanisms in such systems, a property that is well known since system theory and cybernetics are in use. In contemporary literature the term "metabolism" is most often applied to comprehend the physiological processes of anthropogenic ecosystems.

On a global scale the material management system can be characterized by three main processes and 12 fluxes (Fig.2). In a first approximation planet earth is considered as a physically closed system. The external energy source sun emits radiation energy to the planet. Transformed energy is reemitted to the universe. Within the system there are three distinct processes interconnected with material fluxes, e.g. water from the geosphere to the biosphere, organic carbon from the biosphere to the anthroposphere, metals from the anthroposphere to the biosphere. Each system has its own material or resource stock. "Sustainable Development" expresses a normative position with regard to man's use of these resources (WCED 1987). On a long-term scale, the anthroposphere should function on the basis of renewable resources in such a way that the stocks of the other spheres are not diminished. In this respect "stocks" include not only material resources such as fresh water or timber in forests, but also the wealth of biodiversity in the ecosystems of the biosphere and the economic and social quality of the anthroposphere. Next generations should have the same opportunities to develop their anthroposphere with respect to the wealth of resources of the other two spheres. An illustration of the problems to be solved, with regard to physical resources, is given in chapter 3.

2.3 Expectations of science based societies for a sustainable development

The growing anthroposphere has become a "global player", colonizing and transforming partly the biosphere and exploiting the geosphere. In principle we know the physical boundary conditions. The questions are, with regard to SD: What are the needs now and in the future? What are the sizes of the stocks and flows? What is the carrying capacity of planet earth, considering a growing human population and a growing resource demand per capita?

At the beginning of the 21st century the great majority of political systems base the answers to these questions on scientific expertise. It is expected that scientists practice an "early recognition of severe risks" and counsel political leaders and the public with regard to the advantages and disadvantages of various measures to minimize the risks. Furthermore it is expected that scientist engage in the entrepreneurship to make the engineering tools (technical, economical, social, political) to realize the measures that have been decided upon. With regard to environmental protection we dispose of approximately fifty years experience with such a political process. It takes at least 30 years, from "early recognition" of an "environmental problem" (e.g. water pollution) to a political decision, based on a scientific cause/effect-model, to the realization of the measures and to the achievement of the quality goals set (e.g. clean waters). The quality of fresh water is a problem that can be solved, in many cases, on a local and regional scale within this time frame (Baccini and Brunner 1991). However we are also confronted with human induced changes on a global scale. An actual example is the changing chemical composition of the atmosphere and the resulting physical properties of its energy household. We do not know yet how long it will take to control the climate change and to what extent it will influence the life of future generations at various regions on the globe. In this example it becomes obvious that the time period from early recognition of science (indications and first hypotheses already published in the eighties of the 20th century) to a global

"control on the chemical composition of the atmosphere" comprises at least a century. Furthermore the starting points of the various societies to enter such a program of adaptation are very diverse. The "magic triangle" of SD, presenting the essential corners, namely the social, economical and ecological norms and measures of SD, is not more than a didactically well designed reminder of the framing of SD. It does neither supply the tools to tackle the problems nor does it help to make sound decisions with regard to projects in the direction of SD.

3. Resource management in the context of sustainable development

3.1 Case study "To Nourish"

Two local cases in very different cultural situations, namely in a peasant society of Nicaragua (Pfister and Baccini 2005) and in an urban society in Western Europe, namely an urban system in the Swiss Lowlands (Faist 2000), serve to illustrate the distinct differences of the activity "To Nourish" (definition see Baccini and Brunner 1991). In both cases economically extended MFA was used (Kytzia et al. 2004). The method is already well equipped to elucidate the relevant physiological characteristics of the systems studied. The peasant society (A) consists mainly of farmers, grouped in families, practicing a subsistence economy. The region they are living in belongs to the poorest ones on earth. In contrast the urban society is rooted in one of the richest countries in Europe. The synoptic presentation of some results is given in Tab. 1.

Table 1: Comparison of a peasant society in Nicaragua (Pfister 2005) and an urban society in Western Europe (Faist 2000) with regard to their energy demand in the activity "to nourish" and to their economical effort.
(Energy flows in Gigajoule per capita and year)

	Agrar A		Urban U	
	GJ/cap&y	Self-Sufficiency %	GJ/cap&y	Self-Sufficiency %
Energy total	19	80	180	10
Energy to Nourish	17		30	
Regional Supply		>90		60
Ratio of total income	> 80 %		10 %	

The total energy consumption of U is approximately tenfold of A. For the activity "To Nourish" (including agricultural production, upgrading and distribution, consumption) A needs roughly 90% of its total energy demand, whereas U can manage with only 20% of its total. A's energy source is from local forests (80% self-sufficiency). U's energy carriers are mainly fossil fuels and are imported. U needs 80% of its energy demand for the activities "to reside and work" and "to transport and communicate". A's food is mainly produced within the region (90% self-sufficiency). U needs, on the bottom line (taking import/export flows into

account), a "global Hinterland" for approximately 40% of its food demand. In A the peasant household has to spend roughly 90% of its income for food, whereas the urban household can manage this activity with only 10% (average values) of its total income. In the comparison of the two cases the following additional insights must be stated:

a) The peasants in A have a reasonable strategy in their agricultural production. Due to their increasing population their system is neither economically nor ecologically sustainable. They need a "Hinterland" where they can sell their labor force. However the "Hinterland" cannot offer enough labor. A second source of income is the cash crop coffee, a product to be sold on the global market that is mostly out of reach for poor farmers. Their main problems are thus population growth and the lack of a strong complementary region offering labor and/or good prices for agricultural products.

b) The people in U are economically successful in a global market, mostly due to their products in the tertiary sector. However, due to their strong dependence on non-renewable energy sources (see Fig. 4 and 6) their system is not sustainable on the long-term (see also chapter 4). Without reconstruction of their physical infrastructure from a fossil to a solar system within the next two to three generations, U will collapse.

These two cases underline the statement from chapter 2.2. The starting positions of an A and a U society to enter an SD process are completely different, only seen from an ecological and an economical point of view. Here the various differences in political and social culture are not yet considered. Since the developed countries with their new urbanity consume about 80% of the demand of the total anthroposphere, the focus in the resource management for a sustainable development is on these urban systems.

3.2 The urban metabolism in developed countries

The anthroposphere of the 21st century (Fig.2) can be seen as a heterogeneous patchwork of urban systems. In order to meet the ecological criteria of a sustainable development the metabolism of urban systems has to be evaluated with regard to the regional and global stocks. In the following the metabolism of a typical urban system is exemplified with the Swiss Lowland region (Baccini 1997). In this region a communication network was built within 40 years (1950-1990) allowing practically every inhabitant, independent of his residence place, to reach any urban activity within half an hour. The region has become a "compact" urban system (5 Million inhabitants, population density 500 capita per km^2). The forest area stays constant, due to a forest conservation law. The agricultural land is constantly reduced, but increases steadily its productivity. Neither territorial planning nor environmental protection measurements (since 1970) have influenced significantly the growth of the urban settlement area and its metabolic rate (consumption of Joule and Kilogram per capita or km^2 and year).

There is enough territory "on reserve" to continue this regional growth (3m^2 per capita and year for the next 20-30 years).

Four essential mass goods of the urban metabolism, namely water, biomass, construction materials and energy carriers were investigated in this region [Baccini and Oswald 1998]. The results reflect the actual situation in a quasi steady state situation. On the basis of these material managements systems, metabolic scenarios for different types of urban development strategies can be sketched (Baccini und Bader 1996).

a) **Water**

The summarized water management system (Fig.3) shows the following quantitative characteristics:

1) The surface waters form the dominant flux, due to the river Aare which flows through the region. It is responsible for 99% of the annual turnover.
2) Approximately 20% of the regional net precipitation is needed to cover the demands of the anthroposphere.

3) The water supply system is a technically well-developed network and allows a flexible distribution of drinking water. It depends 100% on the regional groundwater reservoir.

4) The rate of the annual groundwater consumption is in the same order of magnitude as the annual rate of groundwater input from precipitation, filtered mainly by the agricultural soil and the forests.

The qualitative aspects can be summarized as follows:

1) More than 95% of the used water passes over sewage treatment plants. The treated waters are directed into the surface waters.

2) The main surface water (the Aare), due to its high dilution capacity, is not a good indicator for metabolic processes in the regional water system.

3) Since measurements of groundwater composition exist (1954) a slow but steady decrease of quality is observed (e.g. increase of nitrate concentration from 10-15 mg/l to 25 -30 mg/l), mainly due to the agricultural activity in the drainage area.
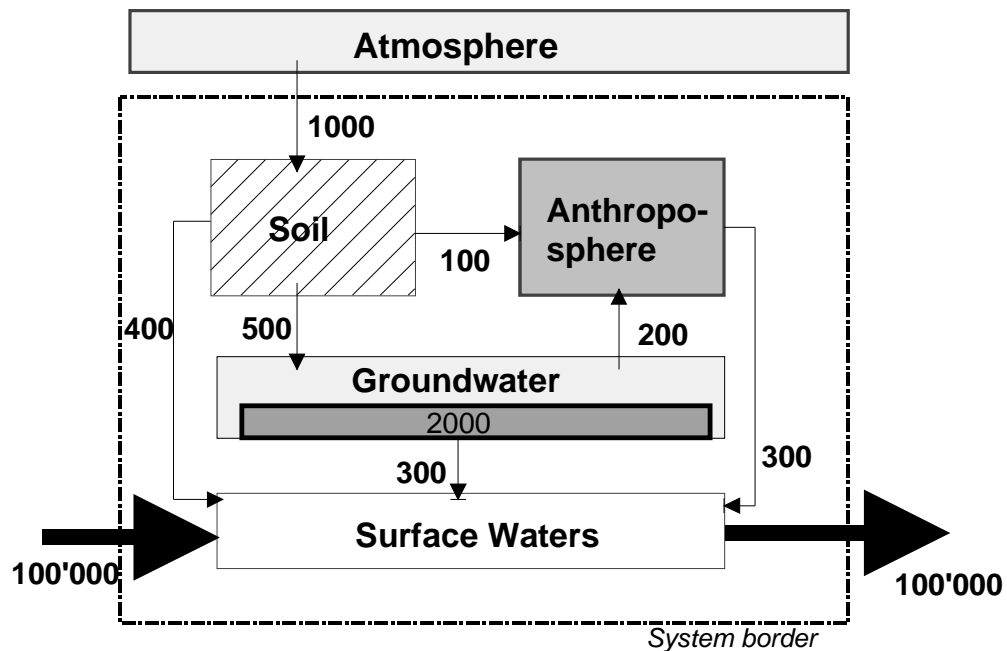
Figure 3: Water management system for an urban region in the Swiss Lowlands, (after Henseler et al. in: Baccini and Oswald 1998). The flux unit is m^3 water per capita and year; the stock unit m^3 per capita

The following conclusions can be drawn:

1) An appropriate hydrological model for the water management within the urban system is still lacking. Such a model is indispensable to evaluate different scenarios of the water management system.

2) There are mainly qualitative indications that the use of groundwater does not meet yet the criteria of "Sustainability".

b) **Biomass**

A carbon flux study of the region illustrates the biomass management (Fig.4). For each of the three processes only net fluxes are shown. Due to the fact that the agricultural production is oriented towards a high animal diet (diary products and meat) the net transformation of assimilated carbon into food is relatively low (<15%). The degree of self sufficiency is about 60% (For the total demand of 200 kg per capita and year 80 have to be imported). The agricultural production is strongly controlled and financially subsidized by the federal government.

The biomass stock in the settlement, about 5000 kg/cap (mainly due to wood in the construction materials) is in the same order of magnitude as the stock in the forests (8000 kg/cap). The forests are not in a steady state at the moment. They are growing at a rate of about 0.5% per year due to economical reasons (low prices on the market and more competitive imports). The degree of self sufficiency lies theoretically at a level of 70%. The dominant flux however is the carbon input in fossil fuels (from external fossil biomass stocks) to run the housing estates and the transportation in the settlement area. The resulting outputs (CO_2) are globally diluted in the atmosphere.
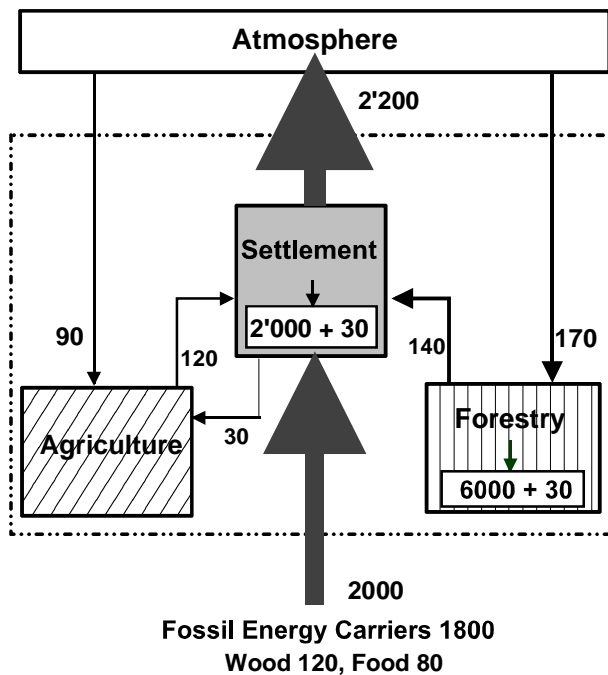
Figure 4: Carbon flux in an urban system (Swiss Lowland region). Flux unit in kg carbon per capita and year; stock unit in kg per capita. "Agriculture" covers 55%, "Forestry" 33% and the "Settlement" 12% of the total area (after Baccini and Bader 1996).

The following conclusions can be drawn:

1) A "Hinterland" for the activity "To Nourish" is necessary. A change towards a vegetarian diet of the inhabitants could have the strongest quantitative influence on the degree of self-sufficiency.

2) There is a large disparity between the ecological potential and the actual economical value of the two subsystems "agriculture" and "forestry". Within the urban system, agriculture and forestry have become a new type of commons, (due to the high degree of subsidy) whose role has to be newly defined under the aspects of sustainability.

c) **Construction material**

The gravel and sand use in the region is based mainly on regional reservoirs (Fig.5). With the actual annual consumption rate the stocks will hold for several more generations. However the rate of renewal by natural processes (boulder detritus from rivers) is two to three orders of magnitudes lower. In buildings and underground construction the stocks in gravel and sand (mostly in form of concrete) have accumulated to approximately 300 tons per capita. For Swiss settlement area gravel and sand is responsible for about 80% of the total mass. In other words the gravel in the "settlement stocks" is in the same order of magnitude as the gravel in the natural stocks. The settlement area is still growing, at a rate of about 1 to 2 % per year. At present the contribution of recycled construction material is relatively low (< 20%). Most demolition waste is still deposited in landfills. Most energy used in this subsystem (> 90%) is used to "run the buildings" (heating, cooling). The energy for fabrication is an order of magnitude lower. A substitution of natural gravel by other rocklike material would be easily possible in this region, from an energetic and resource point of view. Only small increases of energy demands will be necessary to exploit other stocks from the lithosphere.
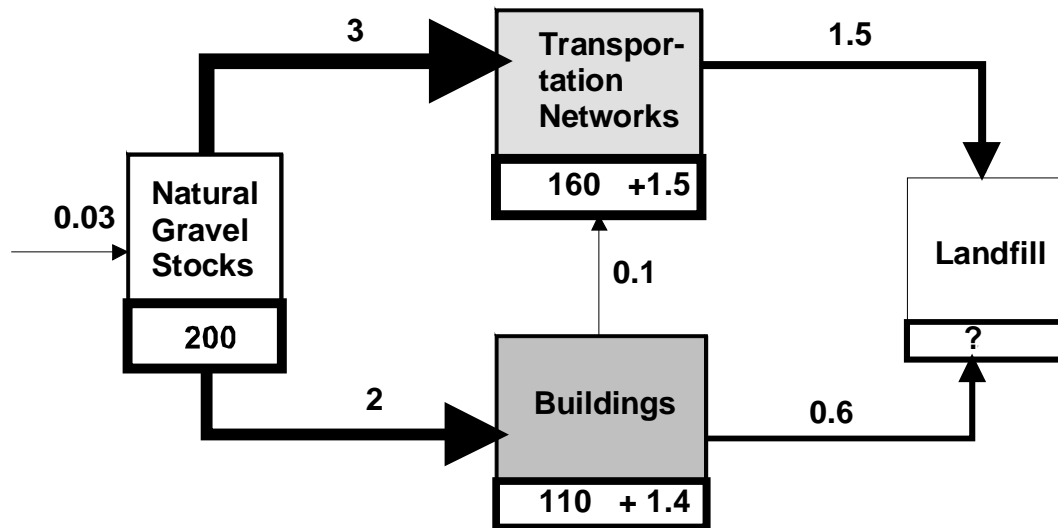
Figure 5: Gravel management in an urban system (Swiss Lowlands) after Baccini and Bader 1996. Flux unit in tons gravel per capita and year; stocks in tons per capita

It follows that the rate determining step in achieving a new status of the construction work is the change in the fabric of buildings and in the type of transportation networks.

d) **Energy**

The energy supply stems mostly from external fossil stocks (Fig.6). Fossil fuels are the dominant energy carriers (see also Fig.4). Building maintenance and transportation together are responsible for almost three fourth of the total energy consumption. On a long-term and global scale this urban system is not "sustainable" because it depends mostly on non-renewable energy resources. According to the data given in figure 5 the system has not the "ecological potential" to replace this large fossil energy demand by autochthonous biomass. New solar technologies would be needed, coupled with a drastic increase of energy efficiency to reduce strongly the primary energy demand.
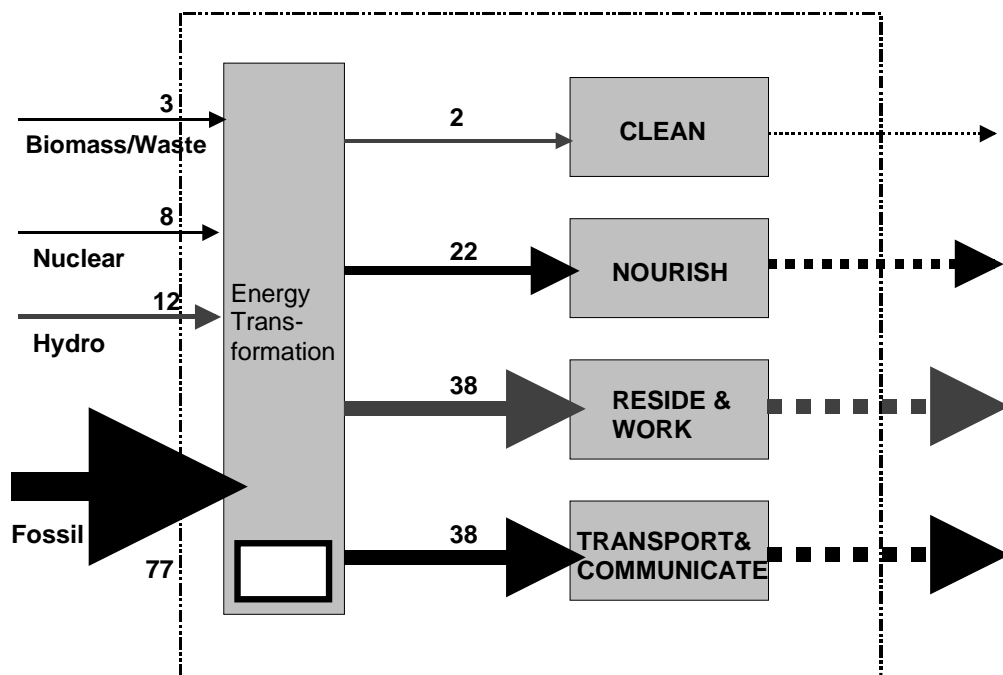
Figure 6: Energy flows in an urban system (Swiss Lowlands), given in percentages of the total. The total primary energy input amounts to approximately 180 GJ per capita and year or 6000 Watt per capita (imported "grey energy" included).

From a metabolic point of view an urban system of the type "20th century", exemplified with the Swiss Lowlands, has the following main characteristics: The settlement stock and the type of energy transformation are the key factors to gain a "status of sustainability". The other three mass goods (water, biomass and construction materials) are less critical for the region studied, i.e. less effort would have to be applied to reach their desired status in material management. From an engineering point of view it follows that a transformation to a "sustainable status" is only possible by a reconstruction of the urban system, i.e. buildings and transportation network.

3.3 Consequences in a global and long-term perspective

Each urban system has its idiosyncrasies with regard to the essential mass goods and the corresponding "Hinterlands", illustrated above with a European example. To reach a "physiological status of sustainability" the system has to measure its resource demand on the "global scale of scarcity". There are several studies available to illustrate the "ecological footprint" of large urban systems (see for example "sustainable Netherlands" by Buitenkamp et al. 1992). An illustration is given in Table 2. As with the territories a globalization of the urban system would not reduce the available productive area for agriculture and forestry by more than a few percent. If the forestry management is limited to the present timber demand of urban systems, the global reservoir could satisfy the annual need by its annual increment of 1-2% of the stock. Even if there are still uncertainties about the size of fossil energy reservoirs, the oil example illustrates that a globalization of the urban system type would not be possible for 8 billion people. The copper example illustrates the following phenomenon: The theoretical copper ore reservoir in the earth crust per capita for 8 billion people is equal to the per capita stock already accumulated in the developed urban system. It is obvious that urban systems are about to become secondary mining sites for copper.

Table 2: A selection of estimated resource reservoirs per capita for a world population of 8 billion, compared with corresponding stocks and actual consumption rates in developed urban systems. The data, giving only order of magnitudes, is based on published resource estimations such as Global 2000, Buitenkamp 1992, and Zeltner 1999 .

	Global reservoirs for 8 billion people	Stocks in develop. urban systems	Consumption rates in developed urban systems
Territories	ha/capita	ha/capita	ha/cap. & year
Agriculture	0.5		
Forestry	0.3		
Settlement		0.03	0.0001
Timber	m^3/capita 50	m^3/capita 10	m^3/cap. & year 0.4
Oil	GJ/capita 800	GJ/capita 40	GJ/cap. & year 100
Copper	kg/capita 300	kg/capita 300	kg/cap.& year 10

These four resource management examples give support to the hypothesis that the anthroposphere is in a transition state (Fig.1). This transition started around 1800 and will last about 300 years or 10 generations until the end of the 21st century. It is a transition from one type of solar system, the agrarian, to a new type, the urban. From a physiological point of view the transition is supported by limited fossil energy. Furthermore it is postulated that this transition needs a primordial effort of the developed urban systems to reduce their consumption of essential resources by a factor 3 to 5, depending on their actual regional situation. The relative consumption rates in function of the cultural period are illustrated in figure 7. As mentioned before (example Swiss Lowlands) a reconstruction of the urban systems of the developed countries is based on the following hypothesizes:

1. There is enough territory "on reserve" to continue the urban growth ($1m^2$ per capita and year for the next 50 years). It is not a question of size, but of design. The actual design of the "cultural landscape" decreases biodiversity (Rio 92 declaration to save biodiversity, one important indicator for sustainable development).

2. The dependence of non-renewable energy (fossil fuels) is the most critical physiological aspect, concerning the limited reservoirs and the effects on climate change, followed by the fresh water shortage for crop production in some regions.

3. The rate-determining step is the reconstruction of the "built anthroposphere" (not a specific technology innovation) with a drastic improvement of its ecological quality.
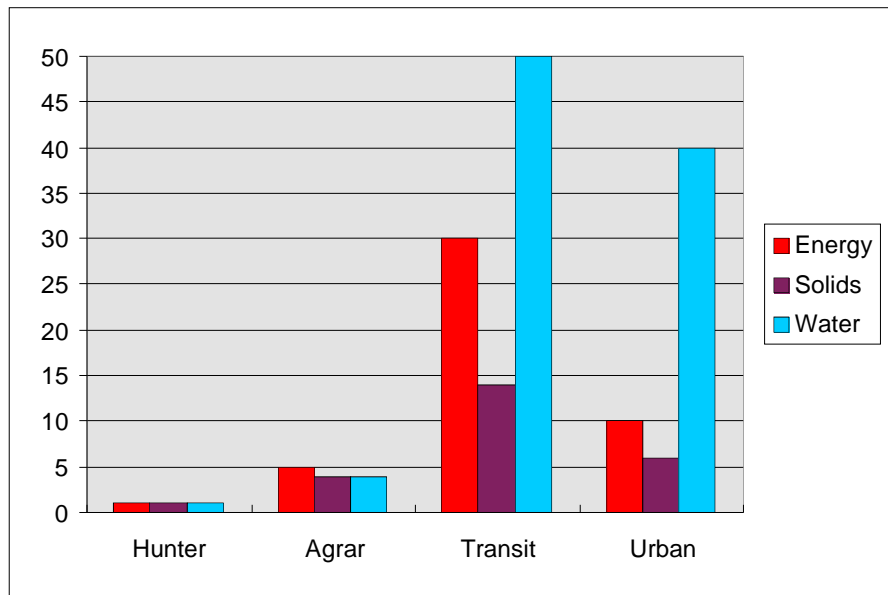
Figure 7: Relative consumption rate of energy, solids (construction materials) and water in different cultural periods (see also Fig.1). The consumption rate of the Hunter and Gatherers is equal 1 for all three resources.

3.4. Concepts for reconstructing urban systems in the 21st century

With regard to the physiological aspects a reconstruction process has to focus on two key factors, namely the already existing material stocks within the urban infrastructure and the redesign of the energy supply to run the urban system. These two aspects are illustrated in the following.

1) Growth and steady state of the urban stock:
An urban system in growth (Fig.8a) shows a mean stock increment of 1-3% per year (Baccini and Bader 1996), mainly from primary sources (e.g. gravel, clay, timber, metal, glass etc.). During this period, the secondary resources could by far not satisfy the overall demand. In this case most of the engineering activity is found in the so called production branches. If the population gets stabilized and the per capita consumption reaches an optimal level (a quasi steady-state situation), the urban stock becomes the main mining site and the secondary resources are the important source for the further transformation of the urban infrastructure (Fig. 8b). By this the process waste management becomes much more important in the primary and secondary sector of the urban economy.

a) Growth
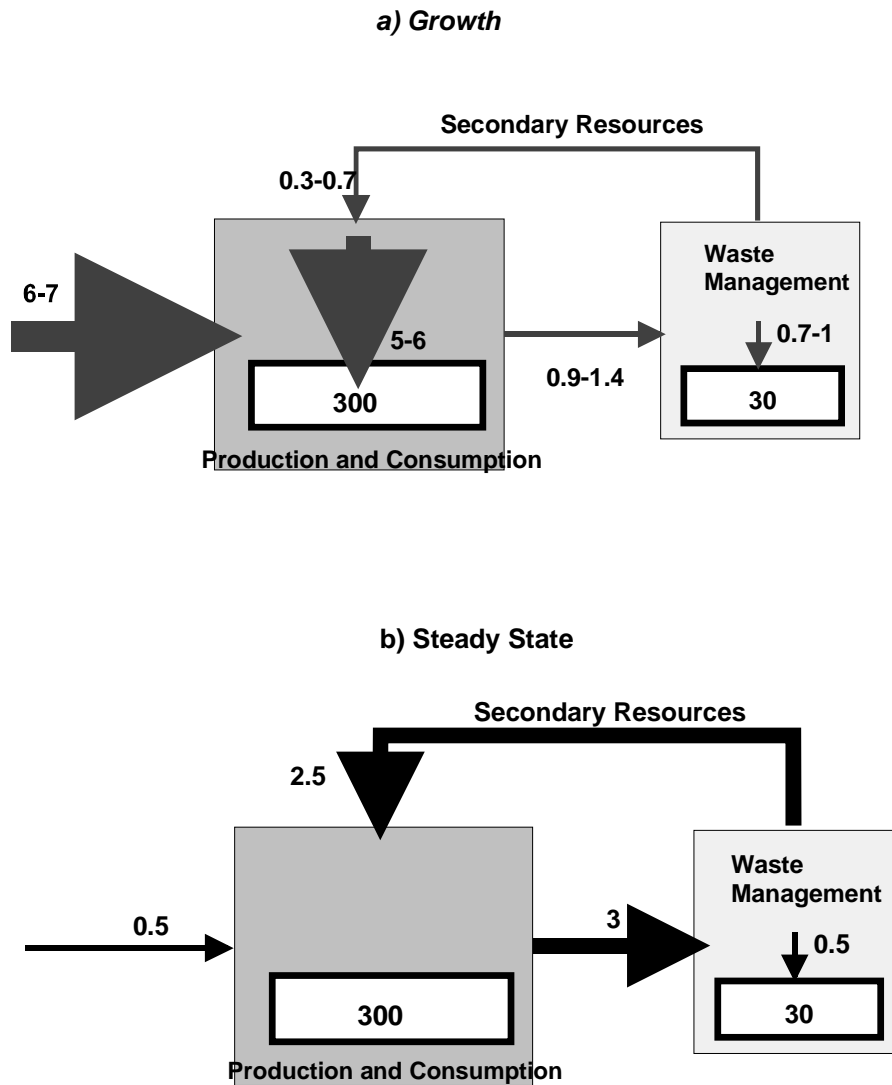
b) Steady State

Figure 8: Material management scheme of an urban system in the a) growth phase and b) steady state phase. The flux unit is in tons per capita and year; the stocks in tons per capita

The built stock of the anthroposphere serves as the main source (urban mining). There are already some regional examples for this type of material management, e.g. paper, glass, iron, for which the consumption flux shows relatively low growth rates and small stock increment. In these cases the secondary sources have become the dominant ones, due to economical reasons. However, with regard to the overall fluxes, their quantitative contribution is yet very small.

2) The reconstruction of the energy household:

The transition from the actual energy management of urban systems (see Fig. 7) to a "sustainable status" comprehends two steps: a) the redesign of the supply, i.e. the substitution of non-

renewable by renewable energy carriers and b) the restructuring of the urban system to increase significantly the energy efficiency (Baccini and Imboden 2001). The present situation corresponds to a 6000 Watt society (see Fig.6) which depends mainly on external fossil fuels. For a transfer to a 2000 Watt society, only known and in practice realized technologies were applied (Baccini and Imboden 2001). Such a reconstruction takes at least 50 to 60 years.
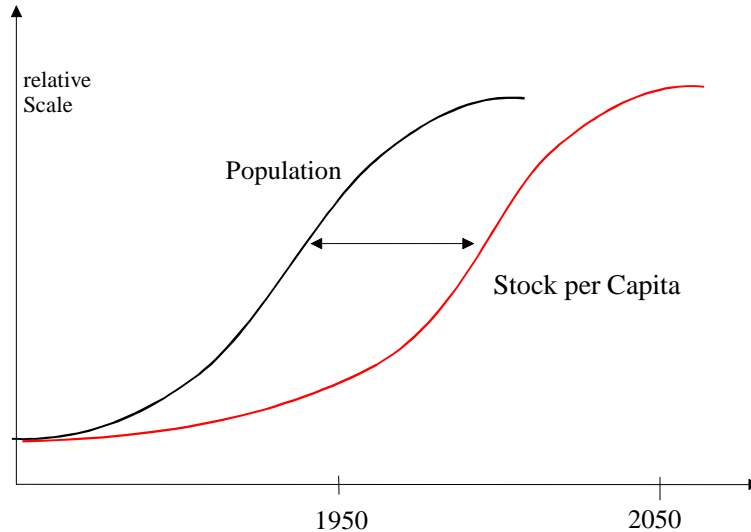
Figure 9: Logistic Growth of Urban Populations and Urban Stocks per Capita

The affluent societies (about 20% of the global population)show the following growth characteristics: A logistic growth of population from the 19th century, to a nearly steady state at the end of the 20th century. A similar growth of the material stock per capita (with a time shift of about 30 years) takes place. The developing countries (80% of the global population) is about to repeat this process, taking off at the end of the 20th century.

4. Sustainable development as strategy in cultural evolution

The notion "cultural evolution" is not yet an established term in scientific literature. Archaeologists, anthropologists, sociologists and natural scientists can at least agree that in the last 10'000 years the essence of human life with regard to its institutional and technical properties has become more complex and the production and distribution of knowledge has increased continually. Neuroscience and brain research confront us with new discoveries of our cognitive systems. Their results will eventually change our views of the world (Singer 2003). The cultural phenomenon "heading for sustainable development" is a moving target. It is essentially a survival strategy in the 21st century, taking into account that the starting positions are quite diverse (Fig.9).
After roughly 20 years of experience with this project, truly a very short period for a first balance, a modest agreement, based on ethical debates, can be formulated (Hirsch and Brun 2007):
-      Satisfy the "basic needs" for all (global scale)
-      Do it in a "just" way (for present and future generations)

- "Consider" cultural diversity (farewell to cultural imperialism)
- Respect the "limits of natural resources" (all scales)

The permanent controversy lies in answering the questions on each scale: What are the "basic needs"? What is "just"? What means "considering cultural diversity"? What are the "limits of natural resources"? Sustainable development is a learning process.

The challenge of this symposium is to find sound contributions to this learning process and to be aware of the fact that in our hidden agendas there is a high cultural diversity to deal with.

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Geography Education For Sustainable Development

Hartwig Haubrich (Freiburg)

Abstract:

This keynote will be based on the objectives of the UN Decade of Education for Sustainable Development (UNDESD) 2005-14, i.e. its vision of education for sustainable development as "a world where everyone has the opportunity to benefit from quality education and learns the values, behaviour and lifestyles required for sustainable future and for positive societal transformation" (http.//portal.unesco/org.education/).
Nearly all "action themes" of UNDESD as environment, water, rural development, sustainable consumption, sustainable tourism, intercultural understanding, cultural diversity, climate change, disaster reduction, biodiversity, market economy etc. have a geographical dimension.
Therefore it is necessary that the paradigm of sustainable development will be integrated into the teaching of geography at all levels and in all regions of the world in the right manner.
That is the reason why at first the eco-system "human-earth" and the paradigm of sustainable development will be explained. The sustainable development of the earth consists of the sustainable development of nature, economy and society as well. Having defined what sustainable development means the main strategies will be listed which have to be implemented to realize sustainable development.
On that basis it will become possible to present educational principles and methods which should be used and competencies which should be approached in geography education because they are needed to implement sustainable development at regional, national, international and global level.

Keywords: UN Decade of Education for Sustainable Development, Ecosystem "Human-Earth", Paradigm of Sustainable Development, Strategies for Implementing Sustainable Development, Principles of Education for Sustainable Development, Competencies for Sustainable Development, Methods to Teach Sustainable Development

1. Introduction

Dear colleagues,
according to the wishes of the local organizer, Professor Sibylle Reinfried, the goals of my paper are
   1. to explain basic ideas of the United Nations paradigm of sustainable development,
   2. to offer some thoughts about the contribution of geographical education to implement sustainable development.
   3. to prepare for the discussion on the Declaration on Geographical Education for Sustainable Development, which will hopefully be proclaimed this afternoon.
The precondition to the acceptance of my following ideas is that one shares the vision on education for sustainable development of the United Nations Decade of Education for Sustainable Development (UNDESD) 2005-14. They envisage "a world where everyone has the opportunity to benefit from quality education and learns the values, behaviour and lifestyles required for sustainable future and for positive societal transformation". The details of the progress of UNDESD can be found on the UNESCO website dedicated to this theme: (http://portal.unesco.org/educations).

Nearly all "action themes" of the Decade for Education for Sustainable Development have a geographical dimension. They include environment, water, rural development, sustainable consumption, sustainable tourism, intercultural understanding, cultural diversity, climate change, disaster reduction and biodiversity. In the light of this, it is necessary that the paradigm of sustainable development will be integrated into geography research and teaching at all levels and in all regions of the world in the right manner.

2. What does the term 'ecosystem human-earth' mean?

At the Rio Earth Summit 1992 nearly all countries of the world agreed to do their best to implement sustainable development of the ecosystem "human-earth" – also through education as it is said in article 36 of the Agenda 21. The Johannesburg Summit 2002 has now broadened and reconfirmed this paradigm.

But what does the phrase sustainable development of the ecosystem "human-earth" mean? Is it possible to agree one definition? Is any definition culturally determined? How contentious is the phrase?

"Eco" comes from the Greek word "oikos", which means household. In terms of money a household shouldn't spend more than it earns. Ecology is the science of house-keeping, to keep the household of the ecosystem "human-earth", which includes the nature or natural environment, the society and culture and the economy as well.

Systems are characterized by special relationships between what is inside and what is outside a particular system. These relationships consist of flows of matter, energy and/or information. Any system has a structured inner world and a boundary dividing it from the outer world. The outer world is less connected with the system than the elements of the inner world. Despite this, there is an exchange as input and output of energy, matter and/or information between the outer world and the inner world of a system. Such systems are called open systems. They contain subsystems with special environments.

The ecosystem "human-earth" can be differentiated into the systems earth, society and individual.

The system earth or geopsphere consists of subsystems as the lithosphere, atmosphere, pedosphere, hydrosphere, biosphere and the anthroposphere.

The outer world of the system earth is the cosmos or exterritorial- space. There is an exchange of energy between sun, space and the earth. The earth offers society the necessary resources and sinks as air, water and soil. The system society or anthroposphere consists of subsystems including settlements, agriculture, industry and traffic. Geographers study how the geosphere provides resources and living space for society and how society has an impact on the system "earth". In this way geographers build a bridge between the natural and human sciences and seek to understand the whole ecosystem "human-earth".

Society offers the individual such essentials for survival as food, water, housing, infrastructure, security and education. In return individuals provide their services and labour. The exchange between individuals and society also contains knowledge, ideas, norms, values and attitudes. Society is acting in neither a geo-deterministic nor in a socio-deterministic way.

The **individual** is of special interest for educators, because the education of individuals is one of the most important ways of contributing to an understanding of sustainable development. The exchange of information between the individual and society aims at the socialisation of the individual on the one hand and at the development of society on the other. The freedom of the individual within a particular frame of natural and social conditions is the precondition that education can have an impact on people's environmental behaviour and therefore on sustainable development.

A consequence of this thinking in systems is the necessity to think ecologically or holistically, i.e. how nature, society and individuals are interconnected.

3. What does the paradigm of 'sustainable development' mean?

Often there is confusion between the terms sustainability and sustainable development. Sustainability is a term coming from ecology. It refers to the potential of an ecosystem to subsist over time in a balanced way. But the focus of sustainable development has been shifted from ecology to society. Its aim is to include environmental considerations in the steering of societal change, especially through changes to the way in which the economy functions. Therefore in our context we should speak about sustainable development and not about sustainability.
Ekins differentiates **three pillars of sustainable development**:
Promoting sustainable development is about steering societal change at the interface between the social, the economic and the ecological:
The social relates to human mores and values, relationships and institutions.
The economic concerns the allocation and distribution of scarce resources.
The ecological involves the contribution of both the economic and the social and their effect on the environment and its resources. (Ekins 2000)

According to Susan Baker 2005 **sustainable development is a dynamic concept**. It is not about a society with fixed qualities of social, economic and political standards in an end-situation. Promoting sustainable development is an on-going process across space, time, societies and cultures. Although sustainable development will be different for different societies, there must be certain global or common guidelines that have to be acquired if humanity will get a sustainable future. These guidelines shall help to realize a healthy environment and good governance through the acceptance of certain normative principles. Promoting sustainable development requires therefore the recognition of the common good. Sustainable development is an ongoing, comprehensive social process of change and design that makes it possible both to protect the current generation's quality of life and to safeguard future generations' own life options. Today sustainable development is universally recognised as the way to improve individuals' opportunities and to achieve social prosperity, economic growth and environmental compatibility. Recognition however is a long way from practice.

We must also acknowledge some **differences in the concepts of sustainable development and equality:**

1. Some scientists and politicians differentiate between a **strong and a weak** sustainable development or between **biocentric and anthropocentric** sustainable development. Biocentric or strong means that humans are part of the whole ecosystem "human-earth"- but nothing more - and that nature has its own right that should be respected and protected. Anthropocentric or weak means that humans have the right to use the natural environment for their purposes but they should live with nature in such a way that they shouldn't destroy their own basis of living and instead secure and improve their well being.
2. **Equality (equity)** is one of the main principles of sustainable development. But also here one can find different meanings. There is a difference between the term **equality and equal life chances.** Equality means equal life conditions all the time and equal life chances means everybody should get the same starting conditions, which could be used or not.
3. There are also important differences in understanding of the ways of overcoming the gaps between rich and poor. Some ask for **equality in the distribution of resources** while others ask for **performance equality or justice**, i. e. those who work harder and bring better results should earn more than those whose performance is weaker.
4. Although there may be a general agreement that all people of the World have equal rights –namely human rights - the industry countries continue to take 80% of all resources into their **rucksacks and produce big footprints** on the surface of the earth.

If the developing countries would like to consume the same quantity we would have to look for some additional earths. People do not have comparable living spaces and resources and that is an unsustainable situation, which has to be changed, if we seek a peaceful earth.

The paradigm of sustainable development, which was developed by the "Brundtland Commission" in 1987, is still up to date and based on the insight that "business as usual" in industrialised societies will, eventually, dramatically increase ecological risks, economic disparities and social injustices. The conventional model for industrialised societies is now considered as unsustainable and thus as an unacceptable option for the future.
Current activities to implement sustainable development are still based on the Brundtland Report "Our common future" (World Commission on Environment and Development (WCED) 1987. It is worth to look briefly at this influential document.
The Brundtland Development Paradigm deals with:
-   Changing the quality of growth, making it less material und energy intensive
-   Meeting essential needs for jobs, food, energy, water and sanitation
-   Stabilizing population size relative to available resources
-   Dealing with poverty elimination and education
-   Addressing inequality in access to and distribution of food
-   Addressing the environmental problems of intensive agriculture
-   Maintaining biodiversity for ethical, scientific and medical reasons
-   Halting the destruction of tropical forests
-   Establishing an international species convention
-   Developing alternative energy systems
-   Increasing energy efficiency
-   Promoting the ecological modernization of industry
-   Addressing the problems caused by population shifts from the countryside
   (Selected from WCED 1987)

Summarizing the definitions of the concept of sustainable development it can be said:
Sustainable development consists of sustainable development of nature, economy and society as well.

Sustainable Development of nature means**,** to consume resources not faster than they can be renewed. We have the duty to preserve the resources for the coming generations. The consumption rate shouldn't be higher than the regeneration rate. The same is true for the emission rate, which shouldn't be higher than the assimilation rate.

Sustainable Development of economy does include the sustainable development of nature. Jobs for all and growing living standards remain important targets. For developing countries this means more consumption of natural resources and for industrialised countries it means new resources-saving technologies and particularly new life styles. Of course, to reach these objectives is one of the biggest future challenges.

Sustainable Development of society and culture means equal life chances for all. How can this be realised? Realistically one should at least try to make sure that people in developing countries can satisfy their basic needs and that people in industrialized countries agree to strong directives to limit the consumption of nature. Different cultures will have different understandings on sustainable development, but they should also act in accordance to global agreements.
Sustainable Development needs to study the **interrelationship**s of nature, economy and society but also its **global dimension**. A top down implementation of sustainable development will not succeed, a bottom up participation must be guaranteed – also by education.

More important than ecological laws would be the development of new life styles, values and philosophies, which are seen as a new and better well-being than the old one's and which replace the quantitative production and consumption by a qualitative better nature, economy, society and individual.

4. What are the main strategies for implementing sustainable development?

I will just mention the main strategies to implement sustainable development, which are the following:

- Efficiency-strategy, i. e. through new technical and organisational innovations resources can be used more efficiently.
- Consistency-strategy, i. e. through renewable resources and closed economic circles the ecology of streams of material and energy can be improved.
- Permanency-strategy, i. e. through technical innovations the lifespan of products can be enlarged.
- Sufficiency-strategy, i. e. through new life styles the consumption of resources can be minimized and life can become even more enjoyable.
- Educational and social commitment, i. e. through education and social commitment in communities such as schools, neighbourhoods and clubs social justice, satisfaction and sustainable development can be approached.

Sustainable development means therefore the combination of ecological, economical and societal sustainable development of new production and consumption patterns and last but not least by a new ethic of the individual through education, of course also through Geography Education.

5. "Education for Sustainable Development (ESD)" – what does it mean?

The German National Action Plan of Education for Sustainable Development is for example based on the following philosophy: "Around the world most people agree that there is no time to lose in introducing sustainable approaches and actions. But sustainable development cannot be centrally mandated through a top-down strategy. Sustainable development is a process of social change that affects all people and in which all individuals must participate locally. The Agenda 21 cites the "commitment and genuine involvement of all social groups" and, consequently, "new forms of participation" as keys to sustainable development. This orientation applies to individual citizens – in the places where they live – as well as to society's institutions and to our nation's democratically sanctioned organs. But effective commitment and participation won´t happen. It is the task of education to give people the tools they need to shape the development of their societies in a sustainable manner. It is education that must pave the way to sustainable development.
The aim of education for sustainable development is to put people in a position to play an active role in shaping an ecologically sustainable, economically efficient and socially just environment." (BMBF 2002, p. 4)

6. What are the main principles of "Education for Sustainable Development (ESD)"?

Education for sustainable development is relevant for everyone,
- it is an ongoing, continuous process and
- promotes acceptance of processes of societal change,
- it is a cross-sectoral task that has an integrative function,
- it is aimed at improving the contexts in which people live,
- it creates new opportunities for individuals, society and economic life,
- it promotes global responsibility,
- it is relevant to all levels of learning – in day-care institutions, schools, universities, continuing education, cultural institutions, and research institutes,
- it takes place also outside of educational facilities and institutions,
- it is relevant for municipalities, associations, clubs, companies and families,
- it opens up valuable future.

Because of the broad approach of geography to the most structures which have to be transferred into a sustainable development, geographers and particularly educational geographers are needed in all above mentioned institutions. All educators are encouraged to take the lead in preparing individuals for their active roles in their local communities. This requires for geographical educators to redesign their curricula to incorporate a distinct active, community partnership dimension.

7. What are the geographical qualifications for sustainable development?

The International Charter on Geographical Education draws attention to the most important geographical competencies which are crucial to implement sustainable development of the future world as for example:

Knowledge and Understanding of
- major natural systems of the Earth (landforms, soils, water bodies, climate, vegetation) in order to understand the interaction within and between ecosystems
- major socio-economic systems of the Earth (agriculture, settlement, transport, industry, trade, energy, population and others) in order to achieve a sense of place. This involves understanding the impact of natural conditions on human activities, on the one hand, and the different ways of creating environments according to differing cultural values, religious beliefs, technical, economic and political systems, on the other; etc.

Skills in
- using communication, thinking, practical and social skills to explore geographical topics at a range of scales from local to international; etc

Attitudes and Values to
- dedication to seeking solutions to local, regional, national and international problems at the basis of the "Universal Declaration on Human Rights".

(Selected from International Charter on Geographical Education 1992; p, 1,7f)

The International Charter on Geographical Education (1992, p. 1.9) also states:
"The more knowledge available in the hands of educated people the greater the chances are of significantly reducing environmental damage and preventing future problems. According, there is a primary need to strengthen in all countries, especially the developing ones, their entire educational system as a prerequisite to environmental and development education. Geographical Education contributes to this by ensuring that individuals become aware of the impact of their own behaviour and that of their societies, have access to accurate information and skills to enable them to make environmentally sound decisions, and to develop an environmental ethic to guide their actions."

8. How shall we teach geography to educate students to think and act in terms of sustainable development?

Thinking in networks and systems is an appropriate method for studying ecological issues. Geography, when defined as bridge between natural and human sciences, is well placed to implement this method. Teachers, who are used to teach about environmental issues normally discuss with their students
1. the structure of a problem,
2. the causes of the problem,
3. the potential responses to solve the problem.

Ad. 1. If for example the selected problem is an ecological one it is also necessary to analyse whether the economy and society are also part of the problem. The same has to be done, if the problem is an economic or societal one.

Ad. 2. If the main cause is for example the economy it is also necessary to look whether the ecology and the society are also at least partly causes of the problem. The same has to be done, if the cause is an ecological or societal one.

Ad. 3. The responses or reactions can be of ecological, economical, societal or personal nature. The last one, the personal change of behaviour is the most difficult one. We know that is easier to write letters to politicians to change an unsustainable situation than to change one's own behaviour. To behave ecologically, socially, economically or politically sound should be practised also in Geography Education.

An easily to understand example shall explain the above mentioned theoretical concept on teaching sustainable development.
The topic is "water shortage". There is not enough water to supply a region.
The question is: What are the causes?
There could be an ecological reason, for example some dry seasons caused by global warming could have led to water shortage. In that case it would be necessary to teach about global warming.
There could be an economic reason, for example paper mills are using more and more water. In that case it would be necessary to teach about paper production and its impact on environment and population.
There could be a societal reason, for example private water consumption has been grown steadily. The societal change of people's behaviour would then be a teaching topic.
To analyse a problem is not sufficient in modern geography education. To think about alternative solutions and responses has to be discussed, if education shall qualify students for their participation for example in local agenda activities or generally in politics.
So a solution of the water shortage could be an ecological one, for example one could search for new water resources. In that case a teaching unit on water cycle, groundwater, springs etc. could bring substantial knowledge into the discussion.
If there are not enough new water resources one could think about buying water from a neighbour region. That would mean that additional money has to be earned in order to be able

to pay for the imported water. Now economic knowledge is needed whether the region can afford such a sustainability import.

Societal or political measures could lead to limitations of water consumption of private households and/or water consuming companies.

Finally every student could think about own water consumption, whether at home the tap water is dripping all day or whether the watering of the grass in the garden is necessary. From time to time students could look after their own water consumption indicator to get a feeling how much water is used and what it costs, in order to behave adequately.

This example shows that teaching about sustainable development means teaching holistically. Geography as bridge between natural and human sciences is used to practice such an approach.

In the case of water shortage and generally it is not easy to say what is sustainable. This has to be discussed by the civil society and decided by the government. In order to do so, students have to learn social, communication and political skills. Group work and projects with activities as letters for newspapers, exhibitions at public places etc. are such well known teaching methods. There is a lot of literature, for example, from Green Schools or World Wide Fund on such active methods (OECE/CERI).

9. What topics should be taught?

In Agenda 21 the following topics for teaching can be identified:
Poverty and justice
Consumption
Health and Food
Housing
Environment and development
Climate change
Pollution
Soil degradation
Desertification
Agriculture
Biodiversity
Biotechnology
Water/Oceans
Gender differences
Participation
New Technologies
International cooperation

At first glance it is obvious that nearly every one of these topics has a geographical dimension.

At second glance it is equally obvious that it is not possible to teach all these topics satisfactory.

But what has to be done ?
1. We need - as now - timetabled independent geography courses,
2. But we need also interdisciplinary courses or at least collaboration between different subjects
3. We need a curriculum that clusters different subjects.
4. We cannot teach all topics and therefore we need to select topics according to the local situation.
5. We need to give geography a new active, community partnership dimension.
6. We should try to educate students as described in the following.

10. What interdisciplinary competencies can be learned also through geography education?

If teaching about sustainable development is optimally done, students can learn - beside geographical knowledge - a lot of competencies, as for example:

- to orient on problems,
- to calculate risks,
- to evaluate alternatives,
- to perceive complex cause-effect relations and dynamics,
- to reflect about side effects and consequences, which are to be expected from an action,
- to find, evaluate, process and use information with adequate methods,
- to respect other views and arguments,
- to think about and evaluate one's own personal motives,
- to give one's own life sense and an ethic basis,
- to contribute to common tasks with one's own competences,
- to be able to act in unsure situations,
- to determine one's own objectives and tasks and to present one's own results,
- to evaluate one's own actions and their results,
- to perceive life-long learning as an enrichment of quality of life,
- to perceive problems and phenomena from different perspectives,
- to relate local experiences to global phenomena.

(selected from BMBF 2002)

All these skills are parts of the **action competence** for sustainable development, which must be based on an adequate **value-orientation**. (In Germany we use instead of action competence now more and more the term Gestaltungskompetenz, which is difficult to translate, it means the competence not just to act but to create something what is worthwhile.)
It is obvious that, if the social environment and the whole school environment isn't sustainable and not all teachers behave – at least partly - in a sustainable manner, it is quite impossible to teach effectively about sustainable development with the outcome that each student really changes his or her own behaviour. There is no other way, when we want to master the future, achieving sustainable development has to become one of the most important guiding education principles. We know that geography teachers will be confronted with many difficulties, but geography teachers should be aware, that sustainable development is an open-end process. Joining a Local Agenda 21 group or establishing an own green school agenda can ease this process. And this could be a new role for geography teachers. But they should also know, that many research outcomes have shown, that knowledge and skills are not sufficient for an adequate sustainable behaviour. Most important is the value orientation, which shouldn't be neglected.

Teachers should also know, that students like fun and joy and therefore at first they must have a chance to experience how beautiful nature can be, how precious culture, how worthwhile communities and societies, when they should be ready to protect all these parts of the ecosystem "human-earth".

11. FINAL REMARKS

What has to be done?
1. We have to stop our resource-intensive model of growth and consumption, which is practised by 1 billion people, because the limits of our earth don't allow to transfer it to the other 5 billion people of today or 8 billion people in 2050. A growth model for 8 billion people would cause ecological footprints or rucksacks of at least three earths, and of course, these are not available to us.
2. Equal life chances are an important aim of sustainable development. To reach it, it is necessary to implement a more or less equal level of resource consumption between industry and developing countries – even when it seems utopian. Therefore the industry countries have to shorten their resource-consumption and the developing countries have to limit their population growth.
3. In democratic countries billions of people can vote for those parties which make decisions for sustainable development. Therefore we also need an adequate political education.
4. In many countries billions of people can help through their daily shopping, consumption and leisure behaviour, that the industry is forced to offer sustainable products and services.
5. Geographical Education can contribute that people get the right knowledge, skills, values and attitudes, so that they can approach the aims of the United Nations Decade of Education for Sustainable Development of our Earth. Sustainable Development is future-oriented and a concept of peace between humans and nature and a concept of justice between generations but also between different nations, cultures and regions of the world. In addition to social, environmental and economic concerns the concept of sustainable development also extends to global responsibility and political participation. The action competence, which is needed for such challenges, can be learned in collaboration with other subjects - but particularly through Geographical Education. Geographical Education must not become a training camp for sustainable behaviour, but it must deliver important knowledge, attitudes and abilities enabling people to behave in a sustainable manner. Last but not least, it must give students a value orientation that they can make in freedom mindful and informed choices for a sustainable world.

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The Alps In Geographical Education And Research

Paul Messerli (Berne)

Abstract

Since A. von Humboldt one of the founders of modern Geography had described the world's most famous mountains in a comparative schema, the Alps became a paradigmatic status. In the conception of the German "Landscape Geography" the vertical arrangement of land use systems in accordance with the changing natural conditions was supposed to be a key for studying man's interaction with the natural environment. The "human landscape" was seen as the script of how man transformed the Alps as natural environment into a living place. This imprint of human actions in order to make this living space as productive and reliable as possible is the cultural heritage of former generations of inhabitants and farmers.

C. Troll's concept of landscape ecology that was developed further since the 1950ies emphasizes process oriented landscape research. The household of a landscape was split up into environmental sub-systems. Analytical and numerical modelling of those systems that constitute the natural environment dominates since this part of the Physical Geography.

It is a virtue of the UNESCO Man and Biosphere program that the interactions between man and his environment have come into play again.

Man's impact on mountain eco-systems was the challenging title of that project which mobilised most alpine countries to participate in. The systemic approach developed in common became paradigmatic for a new way of looking at environmental and developmental problems in the Alps.

Since the Rio conference on environment and development in 1992, the mountain agenda as follow up document of this conference and the alpine convention lounged in 1995 by the Ministers of the environment in order to set up a special protection regime for the Alps, governmental and non-governmental organizations search for models and concepts of sustainable development. These initiatives gave rise to new national and international research activities crossing the Alps.

The presentation put this line of geographical research in the context of a changing political perception of the alpine problems as of since the 80ies of the last century. Since the Alps had been called the playground of Europe (1871), the time it took to cross the Alps decreased to 1/5, the number of visitors increased to more than 120 million per year. This contradiction between the invisible Alps on one hand and the crowded Alps on the other is significant for the lasting tension between living place and recreation space. How the recently accomplished National Research Program on "Landscapes and Habitats of the Alps" is going to intervene in the current political debate on mountain development concluded this overview.

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Symposium Session: Outdoor Education and ESD

Places Of Sustainability In Cities: An Outdoor-Teaching Approach

André Odermatt (Zurich), Katja Brundiers (Zurich)

Abstract

In this paper, we suggest an educational approach to outdoor-teaching on urban sustainable development both in a conceptual and practical way. Due to best-practice examples sustainable urban development is presented in its real manifestations as contribution to a transition process of a city. These best-practice examples are selected according to an actor- and action-oriented approach. Actors of sustainable urban development are private companies, public administration, NGOs or neighborhood associations. Their projects provide a wide range of alternative sustainable urban products, activities or services such as car-sharing, a sustainably managed hotel or revitalized urban creeks. By using different methods students will try to define and assess the sustainability of these places. Finally, the students will present their evaluation of sustainable places to their colleagues during a field trip. With this approach, students will get a better understanding of the practical implications of sustainable urban development as well as an insight into how local projects are embedded within global processes. This approach exceeds the normative discourse of sustainable development due to the actor- and action-oriented framework within the concept of transdisciplinarity. The approach encourages students to engage in the societal project of sustainable development by presenting best-practices of services, products or activities aiming at a sustainable urban lifestyle.

Keywords: Sustainability, Cities, Outdoor-Teaching, Best-Practice, Sustainable Urban Lifestyle, Transdisciplinarity

1. Introduction

The UN Decade of Education for Sustainable Development (UNESCO 2007) is currently in its third year. The UN Decade aims at promoting education as an essential foundation for a sustainable society. This implies that the guiding principles of sustainable development must be integrated within all stages of the educational system.

Among the four key education action areas of the UN Decade, we focus and elaborate on the following two points (cf. EDK 2007, 11):

- The reorientation of existing educational programs towards an education for sustainable development in terms of a holistic, interdisciplinary approach: The promotion of knowledge, abilities, lifestyles and values is key to fostering a sustainable development. Important topics are, among others, sustainable production and consumption, gender equality, intercultural understanding and environmental protection.

- The development of a common awareness and understanding of sustainability in society: A deeper understanding of the coherence among the three key dimensions enabling sustainable development should be established, thus enabling individuals to assume responsibility for a sustainable development.

An implementation of these principles requires an integration of an education for sustainability into the formal educational system. In particular, it needs to be embedded in obligatory schooling, academia (teacher-training in particular) and apprenticeships. This can only be achieved by concrete projects that intervene in, and are based on, the daily life of the majority of the population. The key question to be addressed is: How can lifestyle choices and consumption patterns be made more sustainable and thus have less negative impacts? Since the majority of today's population lives in cities, it seems obvious to address sustainable actions in an urban context. The teaching proposal presented in this paper is derived from the project on "sustainable city tours"; a project originally launched by "seed sustainability". "Seed sustainability" initiates and coordinates trans- and interdisciplinary research projects in the area of sustainable development. The platform is an initiative of ETH-sustainability, the centre for sustainability at the ETH Zurich. The implementation we present was conducted as a collaboration of "seed sustainability", the Geographical Institute of the University Zurich and the University of Teacher Training of Zurich. Practice partners from economy, administration, politics and the civil society were engaged as experts.

2. Sustainability and the City

Due to the ongoing global urbanization, cities as spaces for living, economy, culture and nature increasingly become a focal point for the concept of sustainability (Obrist 2005, 24). However, the reality in cities is not as attractive and promising as the drivers that cause urban growth. Cities are equally the place of economic growth and of increasing socio-economic disparities. They are places of social and cultural diversity as well as of disintegration processes. Cities reflect technological progress as well as the ecological impacts of an unbalanced development. Thus, the concept of sustainable development ought to be applied with special reference to cities.

The term "sustainable city" was developed around 1990 (Hugentobler et al 1998, 11). One of the difficulties the numerous projects launched since then is that sustainable development in a complex urban context needs to be understood and implemented in an integral fashion. "City" means much more than simple architectural structures and should be planned according to the three key dimensions of sustainable development. Cities are not only the physical environment of inhabitants, but also social and political constructs. Hence, cities are often areas of conflicts, but also serve as a platform for collective problem-solving providing sustainable urban ways of life (Thorins 2002, 211). Cities consist of manifold social systems that build a global network based on relationships in the production and consumption sectors. With focus on the metropolitan areas in the third world, UN-Habitat defines the aims of a sustainable urban policy as follows (cit. in Obrist 2005, 24):

> "Cities must balance the social, economic and environmental needs of present and future generations. This should include a clear commitment to urban poverty reduction. Leaders for all sections of urban society must have a long-term, strategic vision of sustainable human development and the ability to reconcile divergent interests for the common good."

The establishment of the "Local Agenda 21" in 1992 enabled the application of projects on a local level that meet global demands for sustainability (Klotz 2002, 2). The "Local Agenda 21" is based on a bottom-up approach that emphasizes initiatives of local groups and non-governmental organizations. This way, civil society is included as a central actor, alongside the public authorities and the corporate sector. Since 1992, thousands of communities all around the world have initiated "Local Agenda 21" processes. Zurich has also been part of

this movement since early on. From 1998-2004 the city of Zurich conducted a competition under the heading of "Sustainable Zurich", as a "Local Agenda 21" project (Stadt Zürich 2005). Two contributions to this competition have been integrated in our teaching proposal.

3. Teaching Proposal for Outdoor-teaching

3.1 Methodical Approach

Several authors (e.g. Vielhaber 2006) state an overall failure to incorporate sustainable actions or ideas for a sustainable development of cities into education. Jekel & Rattensberger (2007) claim that this is mainly due to the fact that the normative concept of sustainability is an unwieldy learning objective without any obvious benefit for individuals. Furthermore, they also put the blame on the adopted teaching methods. Thereby a linear correlation between cause and effect is often assumed. The assumption is that by providing sufficient information a sustainable way of life would automatically emerge, due to the personal concern for environmental problems. However, Jekel & Rattenberger (2007) could prove that this assumption does not withstand empirical testing. In fact students are known to experience a severe feeling of powerlessness leading to the conclusion that they as single individuals anyway cannot make a difference. Furthermore, sustainable development cannot simply be introduced as a theoretical subject in the classroom. The credo of the British Department of Education and Skills (2007) sums up the goal of sustainable education concisely:

> "Our students won't just be told about sustainable development, they will see
> and work within it: a living, learning, place in which to explore what a sustain-
> able lifestyle means."

Based on these considerations, it seems appropriate to consider alternative ways of implementing an education on sustainable development in class. We suggest approaching the subject by comprising the student's everyday life and lifestyle and identifying possibilities to live sustainability in a concrete, yet pleasurable, manner. We are convinced that only in this way a learning effect can be achieved that actually results in responsible actions. Relying on the concept of transdisciplinary research as joint learning between science and society, our approach presents sustainable urban development more than merely an issue of complex academic discourse.

We have conceived our teaching proposal as an exploratory self-learning exercise ("Lernaufgabe") (cf. Reinfried 2006, Gasser 2003). The important methodological-pedagogical characteristic of such a learning exercise consists of an independent and active examination of a problem by the students. The following criteria are regarded as attributes of a self-learning exercise:

- given problem situation
- detailed objectives to be achieved
- supply of necessary information and assistance
- indication on the amount of time available
- written preparation, enabling exploratory learning
- problem examination occurs without any assistance by the teacher. Guidance solely results from hints, learning aids or specific working techniques
- integration in a transparent context
- individual, partner or group work
- compliance with mastery check criteria

The following presented self-learning exercise reflects the above mentioned properties and was tested during a project week together with students in teacher-training.

3.2 Teaching Proposal

Based on the fundamental idea of the "Local Agenda 21", we included various projects from different actors as examples of initiatives towards a sustainable urban development as the core of the teaching proposal. This allows capturing, assessing and communicating the sustainability of a city, as well as the issue of "sustainability fallows", specifically for each target group. Thereby, places of sustainability should not solely present one-dimensional success stories of sustainable urban development. So called "sustainability fallows", places where the full potential of sustainable development hasn't been fully realized yet, as well as conflicts of aims and costs should also be addressed. The geographical reach of the project is another important issue. The concept of sustainable city tours refers to the structure and action theory by Giddens and Werlen respectively (cf. Werlen 2000 for a short overview), since daily actions constantly reproduce a city's framework. This means that local actions in a global context are also an important factor for sustainable development. Based on this action-orientated educational concept (Kyburz 2006), we focus on the activity of producers and suppliers of goods and services as well as on operators of urban infrastructures. On the other hand, we concentrate on the consumers of these products and their lifestyles.

Central objective of the project week is a field trip to places of sustainability and the assessment of these places according to an integrative perspective. The excursion substantiates and visualizes what urban sustainable development means:

- Society: Cities are constantly challenged to meet the highly differentiated requirements with regard to living and living environments of locals and migrants, young and old, men and women, families and individuals alike. The places visited on the city tour indicate possible opportunities for living together and dealing with conflicts.
- Environment: What significance do energy-efficiency, resource-savings in construction and air and noise protection have for a city? What is the natural habitat and which ecological niches exist? The places of sustainability show structural potential and scope for the natural and urban environment.
- Economy: Sustainability pays off – for your daily quality of life as well as your wallet. An ecological and social economy strengthens and improves the city's image. The stops on the tour through the city present innovative and successful contributions on how to manage economic challenges.

3.2.1 Preparation

The project week involved extensive preparatory work for the course management. Firstly, the stops of the city tour to be processed, evaluated and visited by the students, had to be selected meticulously. For the assessment, a matrix based on the "need field approach" (Mogalle 2000) was provided. The matrix consists of two parts: the daily activity areas (living, employment/education, recreation, mobility, supply/consumption and communication) and the relevant actors (public authorities, the private sector, and actors in civil society such as NGOs and associations). The selection of adequate places should cover numerous possible combinations.

The selection included two award-winning projects from the above-mentioned competition. One project was launched by residents of a certain district and aimed at restructuring a public square (Gemeindeplatz Hottingen); the second project was a solar power plant operated by local residents (Solarkraftwerk Schwamendingen). Two stops on the city tour were dedicated to sustainable construction and living. One was located in a residential area built in the 1990s (Brahmshof), another one in the neighborhood "Das Dreieick" which was redeveloped by a cooperative. Initiatives of public authorities were addressed with the examples of the program for the revitalization of urban creeks and "Nature around the Schoolhouse". For the area of consumption and employment, a large wholesaler (Migros) and a hotel for women (Lady's

First), additionally contemplated as an employment integration project, were selected. In the area of mobility, a car-sharing provider (Mobility) was chosen as an example of hybrid mobility, and a busy transit road (Weststrasse) was examined with regard to its underutilized sustainability potential. Finally, an NGO from the field of development cooperation (Helvetas) was determined as a place of sustainability. Several of the selected stops can be considered as examples of best-practice. However, some also indicate the present manifold conflicts of aims and untapped sustainability potentials.

Secondly, for each stop a reader with information material was put together and an expert from practice was contacted and an appointment arranged. The expert's role is to act as a resource person, available to students for interviews and thereby offering expert advice and assistance for the sustainability assessment. Further criteria for selecting adequate locations were: easy access (time-wise and for handicapped) and an even distribution over the entire city.

Thirdly, for the assessment of each location an evaluation form was created, based on the guidelines for evaluating sustainability from the Federal Office for Spatial Development (ARE). The final result of all preparations was a highly structured handout containing the assignment, guidance and a template for presenting and assessing the different locations on the city tour.

3.2.2 Implementation

The self-learning exercise was conducted as a project week in February 2007 with 26 students from the University of Teacher Training Zurich in the subject of geography. On the first day of the project week, an introduction to the concept of sustainability in general and on the focus of the urban area was given. With a short exercise the problem of evaluating sustainability was explored. In the afternoon, a field-trip with experts was conducted to illustrate the implementation of the sustainability concept in the energy sector. After an introduction to the basic educational methods of the field trip and the assignment, the students worked in pairs to develop a single tour stop location. This work consisted of reviewing the reader, conducting an interview, making observations and on-site investigations as well as desk research on the Internet. Thus, the students were given plenty of opportunities for independent work. A feedback with the instructors improved the learning effect in the preparation stage. One and a half days were dedicated to the presentation of the results in the form of a field trip. The students proved to be competent speakers and presented the entire range of stops on the city tour to each other. Consequently, the individual learning results on the key dimensions of sustainability for the different projects could be transferred into a collective learning process by comparing the results (cf. Gasser 2003, 174). The resulting outcome was subsequently collected by the instructors and put together in a compendium, containing the self-learning exercise with all documents as well as the work of the students on each location. This document is available on www.seedbox.ch.

3.2.3 Learning Effect

The students got to know the fundamental concept of sustainability, its significance for urban areas as well as the evaluation process of projects and institutions. Since all three key dimensions of sustainability were assessed, and especially the otherwise rather neglected social and economic dimensions were highlighted, the true complexity of sustainability could be presented. The importance of the geographical reach, in the sense of local, regional and global relations, was recognized as a key factor for the assessment process. Sustainability was experienced as an action alternative for a future-orientated society. Although the situation was evaluated in its present manifestations, the history of development was introduced thanks to the expert interviews. An insight into the participative process was thereby enabled, with all

its obstacles and success factors. Sustainability does not simply exist as a ready-made solution that only needs to be acquired and implemented. It is a dynamic result of an intensive and persisting negotiation process. By experiencing successful and simple projects on a local level yet with a global reference, one's own imitative can be encouraged and the feeling of power-lessness and capitulation can be lessened. Likewise, some places of sustainability identified possibilities of achievable sustainable urban lifestyles.

4. Conclusion

The presented outdoor-teaching approach allows students to experience sustainability as a practical model for a sustainable society, and not as the proclamation of an academic construct. By offering this process-orientated perspective, concrete options for future actions are presented as cornerstones of an education for sustainable development. Effects are numerous, ranging from changing one's own consumer behavior to launching own sustainability projects. The teaching proposal can be adapted according to the levels of education as well as in the number of places visited on the city tour. Additionally, a place of sustainability can be integrated into other topics and teaching approaches. For example, the location presenting the revitalization of urban creeks can be employed in a learning unit on water. The work assignment should be designed in such a manner that any amount of further projects, institutions and urban areas can be assessed with regard to their sustainability. From the teacher's point of view, a large amount of initial preparation work is necessary, if the assignment is to be done in a short period of time and should yield substantial results. On the other hand, the evaluation of the project work showed that the students considered the learning effect and the insight into practical sustainability as highly beneficial. Thus during the project week, the students could reflect on the complexity of sustainable development with all its conflicts of aims and acquire competence for the active participation in shaping the future.

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Children's Awareness Of Relationships Between Their Own Town And Rice Field Landscapes Through The Experience Of Rice Planting On The Upstream Of Tenpaku River

Koji Ohnishi (Toyama)

Abstract

The aim of this paper is to show the importance for children to learn the relationship between the upstream and downstream of the river landscape.
The Tenpaku River in Aichi Prefecture got a big flood disaster in September 2000. From the experience of this disaster, many citizens' groups are tackling the disaster prevention activities across the Tenpaku River basin. One of these activities are events for children's experiences of rice planting on the upstream farms and riverside walking (since 2001).
Children, who lived along the river, gathered and experienced rice planting in the spring and harvesting rice in the autumn. In the end of the spring event, the owner of the paddy fields mentioned that the rice planting in the upstream area is very important for the flood control, because of the paddy fields' function for keeping a lot of water and draining adequately the water to the river.
Even though this event aims for learning the meanings of these relationships between the upstream and downstream areas, most of the children forget them. However, they have chances to remember the meanings when they harvest and eat the rice in the autumn. At that time, they remember their experiences in the paddy field landscape in the spring. Some children are aware of the relationships between the landscapes of the paddy fields and the river. The rice cultivation protects the river running in front of their neighborhood.
In the modern society, the landscape of food production is geographically and socially separated from their daily space. But such an environmental education about farming gets back to children's awareness that these spaces are certainly connected to each other, and fosters children's understanding of the meanings of landscape and the importance of farming.

Keywords: Children´s Awareness, Relationship between Upstream and Downstream of the River Landscape

Introduction

The aim of this paper is to show the importance for children to learn the relationship between the upstream and downstream of the river landscape. There are a lot of chances for children to learn disaster mechanism and disaster prevention. In many cases, these lessons are done indoor at school in Japan. But children need outdoor experiences to feel the reality of disaster prevention activities and disaster mechanisms. These days in Japan, many civic groups try to make teaching materials and fieldwork lessons for children about disaster mechanisms and disaster prevention activities in their town (Ohnishi, 2007).
In this study, at first I describe one civic group's disaster prevention learning activities outdoor and teaching materials, and in the next step, examine the effects to children's disaster prevention learning. The study area is the Tenpaku River basin in Aichi Prefecture. There was a big flood disaster in September 2000. From the experience of this disaster, many citizens' groups are tackling the disaster prevention activities across the Tenpaku River basin. This

47

study focuses on one civic group activities. The group is named "Creating community strong against disaster at Tenpaku Basin".

1. Children's disaster learning at Tenpaku River

The civic group has two major disaster learning activities for children. One is "Tenpaku river walking" and another is "rice farming". The purpose of these activities is to give some chances for children to explore and learn the river through experience (Fig.1).
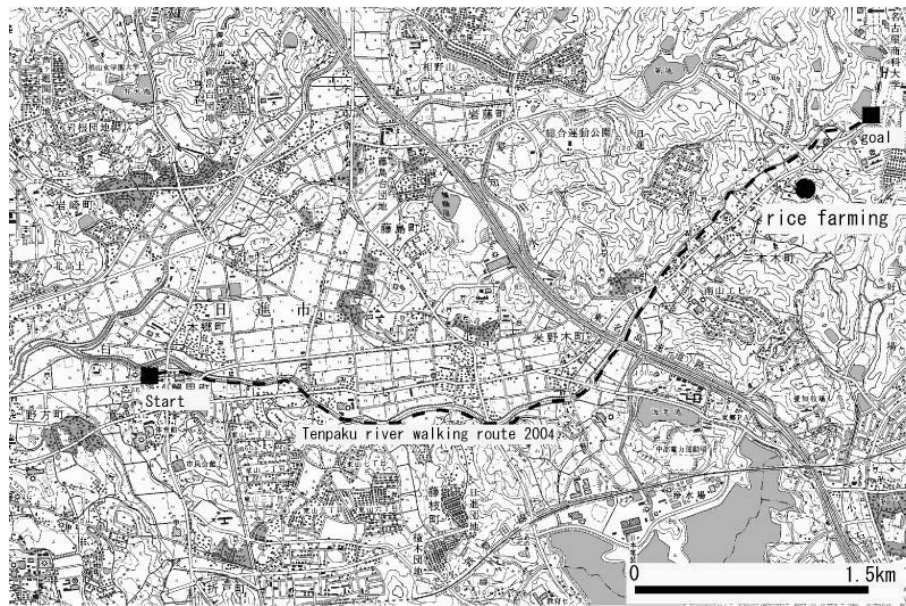
Fig.1: Tenpaku river walking route 2004 and rice farming place

1.2 Tenpaku river walking

"Tenpaku river walking" was planned for children to learn the changes of the river landscape from upstream to downstream. Children know that the river's appearance is changing place by place, but they have few chances to see the actual changes. This event was held 2001 in June after big floods in the year 2000 for the first time. At the event, the children walked through a flood damaged area with topographical maps, marked damaged points and they learned why these places got the heavy disaster damage. They found the disaster was caused by an urban planning mistake and the lack of people's knowledge of geomorphology. It was not only a natural disaster but also a human disaster. But the concept was too complex for children.
For the second test, the content of the walking event for children was changed. In June 2004, the children walked upstream of Tenpaku river. The event organizing team divided the children in three groups and gave roles to every group, like "checking insect and birds", "checking geomorphology and disaster history" and "checking life within the river". Some adults walked with every group.
As they were walking, they marked on the maps where they found the things they checked (Fig.2). During walking, adults explained the meaning of paddy field landscape. For example, "The spreading paddy rice field keep and controls water drainage when we get heavy rain. This effect decreases floods disasters downstream". The children from the downstream area

understood that the river width and depth was downstream much larger than it was upstream. The downstream area children learned that the river was different site by site through their five senses. After walking, they created big maps with the information they gathered and exchanged information. They learned many types of views to river environment (Fig.3).

Fig.2: Checking the map

Fig.3: Drawing the information on a big map

1.3 Rice farming

The event organisation held a rice farming event in the upstream area every year (Fig.4, Fig.5). The paddy fields keep a lot of water so that they have an important function to decrease flood disasters. Children learn that the rice they eat everyday has the function for disaster prevention through rice farming. When they planted rice, they saw a lot of water in the paddy field. They understand that upstream area paddy field landscapes keep a lot of water and that they could keep rainy season and typhoon water. Especially, downstream area children learned the difference of landscape between downstream low lands and upstream, they knew the importance of rice farming to keep their own town.

Fig.4: Rice planting

Fig.5: Harvesting rice

2. Children's awareness of disaster prevention knowledge

Children who participated in these events understood the importance of upstream area paddy fields for disaster prevention at that time. I interviewed the children who participated in the event and lived in the downstream area two months after the walking event and one year after the rice farming event. The children are between 6 years to 9 years old.
Most of children remembered vividly the experience of walking and playing in the river, as well as getting muddy during rice planting. But nearly all of the children forgot the paddy field function of keeping water and reducing flood disaster. Why did they forget such an important thing. The answer is: there were gaps between the experiences and the comprehension ability of the mechanism of flood disaster prevention. But they remembered the experi-

ences and they didn't learn the disaster mechanism and how to prevent it systematically. If they had learned the disaster mechanism, they might have remembered the importance of the upstream paddy fields. But this seems too optimistic.

In this case, the scale of the area is much wider and the phenomena of flooding are too complex for the children to understand. But they will understand the wider scale and complex phenomena as they grow up (Hart, 1979). After they can read small scale maps, they understand the connection of the river from upstream to downstream.

In short term, the activities for children described here are of poor impact on disaster prevention learning.

3. Conclusion

In this paper, it was clarified that most of children forgot the importance of upstream area paddy fields for flood prevention even though they experienced rice planting on the field. It is a poor performance for environmental education in short term. If they learn the function of upper river area paddy fields systematically in the classroom, they may understand and remember much more than just the experience oriented environmental education. But just only the classroom environmental education doesn't foster children's interests to environment. Some of the children cannot synthesize the textbook world and real environment.

Environmental experience is important for children to foster their interest and comprehension about the environment. If children experienced the rice planting and walking along the river from downstream to upstream, teachers and trainers of environmental education give them the key to synthesize the knowledge and experience, guide them to understand the phenomena. Teachers and trainers have to wait till children are older to understand the complex phenomena. Teachers and trainers who want to provide the experience oriented environmental education spend long time for the result. They have to wait and find the adequate timing for children to synthesize the experience and knowledge.

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A Centre For Environmental Information And Education - Students Develop a New Theory-Based Concept To Present The Restoration Of Floodplain Dynamics And Floodplain Forests On The River Danube

Ingrid Hemmer (Eichstätt), Peter Loreth (Eichstätt), Bernd Cyffka (Eichstätt)

Abstract

A project for restoring habitat specific floodplain forests is underway in the Danube valley between Neuburg and Ingolstadt (Germany). It is intended to model the natural water regime by controlled surface flooding in order to allow progression towards natural floodplain vegetation with high biodiversity. This project is accompanied by the Faculty of Mathematics and Geography of the Catholic University of Eichstätt-Ingolstadt. Scientific monitoring was arranged by the Department of Applied Physical Geography. The Department of Geography Education has been authorised to develop a concept for the Environment Education and Information Centre. This visitor centre will be established in a former hunting residence.
The draft of the educational concept, which was meant to consider the approach of sustainable development, was realised within the scope of a project seminar (tutorial workshop) for teacher students. An excursion to the habitat site marked the beginning of the project. With the aid of colleagues from the Departments of Physical Geography and Landscape Ecology, the ecosystem 'floodplain forest' and the human interventions were defined and discussed. Furthermore, the students surveyed pupils and adults for their actual knowledge and preconceptions on this environmental topic and determined their ideas and desires as potential visitors. The main result of the survey was that students and locals have only little knowledge on floodplain forests. This accentuates the need for a visitor centre to highlight this unique ecosystem and restoration-project.

Keywords: Education for Sustainable Development, Environmental Education, Floodplain Forest, Visitor Centre, Preconceptions, Tutorial Workshop

1. Introduction

1.1 The Idea for a Tutorial Workshop

The Danube floodplain between Neuburg and Ingolstadt, about 70km north of Munich, offers extensive floodplain forests surrounding the hunting residence 'Schloss Grünau' (cp. fig. 1). At present a project to restore these floodplain forests is being carried out by the Free State of Bavaria. A Floodplain Centre is being established at 'Schloss Grünau'. This centre includes the already existent 'Aueninstitut Neuburg' (Floodplain Institute Neuburg), which is scientifically overseeing the restoration project and the further development of the forest. In addition, an Environmental Education and Information Centre shall inform the public on aspects of floodplains in general and the current local project in particular.

The concept for the Environmental Education and Information Centre was entrusted to the Department of Geography Education of the Catholic University of Eichstätt-Ingolstadt. The concept was developed during the winter semester 2006/2007 within a tutorial workshop

(project seminar) for teacher students and in cooperation with colleagues from the Department of Physical Geography.

1.2 Basic theoretic and methodical concepts for the conceptual design of the information centre

The project seminar decided to work on the basis of the Model of Didactic Reconstruction (cp. Kattmann et al. 1997). This asks for a scientific analysis of the facts and circumstances as well as of the previous knowledge and ideas of the potential visitors. These two parts should then come together within the exhibition as the, so called, Educational Reconstruction of the Object. The scientific analysis of the facts and circumstances took place in form of a field trip, a seminar lecture and the analysis of sources. The previous knowledge and ideas were clarified by surveying possible visitors to the exhibition.

The conceptual design was meant to be geared to the principles of Environmental Education and Education for Sustainable Development. For Environmental Education cognitive, affective and activating aspects must be considered in the selection of the contents as well as choosing the methods for presentation. According to the concept of Education for Sustainable Development the contents of the exhibition must comply with the following criteria (cp. Hoffmann et al. 2007):
- ecological, economical and social dimension
- global, regional and local dimension
- temporal and dynamic dimension
In addition to the classic 'green' environmental education, the 'cultural turnaround' (cp. de Haan et al. 1997) combined with the aspects 'new lifestyle' and 'participation' should also be integrated.

2. Scientific Analysis

2.1 The floodplain forest system

The Floodplain Restoration Project between Neuburg and Ingolstadt
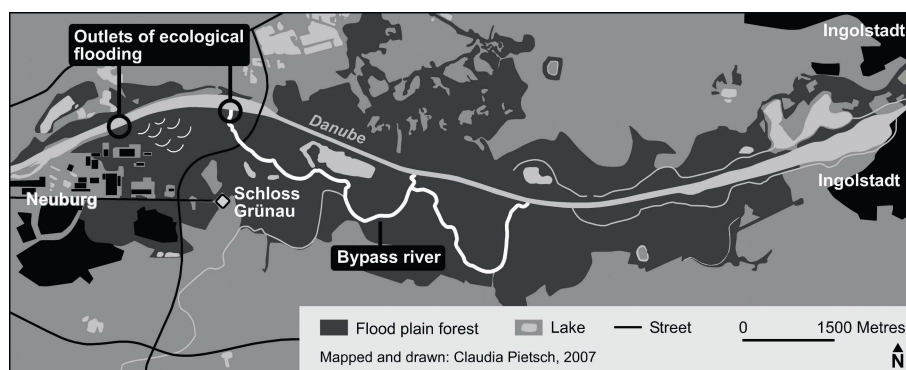
Fig. 1 Area of the project "Restoration of the Floodplain Dynamics and Floodplain Forests between Neuburg and Ingolstadt"

On the Danube floodplain between Neuburg and Ingolstadt an exceptionally large area of floodplain forest has remained (cp. Fig. 1). An area of 2100 ha serves as hunting grounds for the Wittelsbacher gentry and is used for forestry and logging. Due to the straightening of the river in the mid-nineteenth century and the construction of two barrages in 1970 the natural floodplain dynamics have been more or less discontinued. Consequently, the spectrum of species is turning more and more into that of a normal deciduous forest. The remaining floodplain specialists are also in danger of being replaced (cp. Margraf 2004).

In 2006 construction works for a restoration project of this area has begun. The aim is to re-establish the possibility for migrating fish and other species to pass the barrage and other typical floodplain forest conditions. This will be done by ecological floodings starting in 2009 (cp. Cyffka 2006).

In the scientific analysis several topics were focussed out of the overall context of floodplains and floodplain forests. These topics were seen as essential for the understanding of the floodplain system and were to create the framework of the conception. These topics, which will be referred to as modules from now on, are:

- Floodplain forest ecosystems
- Land use on floodplains
- Extent of floodplain forests
- River regulation
- Restoration
- Floods
- Danube portrait

Module Floodplain Forest Ecosystems
The floodplain is a part of a valley which is directly connected with the river via the ground water system and which is periodically or episodically flooded. River, groundwater, soil and vegetation are closely connected within the natural dynamics of the system (cp. Bridge 2003). The natural vegetation is a very species-rich floodplain forest which is ideally adapted to this dynamic habitat and which differs in species, depending on how close or far away from the river it is. Due to their great structural diversity, natural floodplain forests are amongst the ecosystems with the highest biodiversity in Europe (cp. Pott 1995).

Module Land Use on Floodplains
Since the floodplains of Central Europe have been a preferred location for settlement in the past, they were strongly transformed by man. Rivers have always served as water sources, as energy suppliers and as means of transport. The fertile floodplains were used as extensive grazing grounds. The dynamics of the location did not allow an intensive agricultural cultivation. Consequently a mosaic of species-rich cultural-biotopes developed. The original forest vegetation has been almost completely replaced. The remaining forests have been used for forestry and logging and today only represent a degraded form of the original floodplain forests.

Module Extent of Floodplain Forests
Today original floodplain forests are seldom found in Central Europe. A comparison of the potential and the actual distribution shows why floodplain forests are among the most endangered domestic ecosystems.

Module River Regulation
Since the end of the 19th century, when advancements in technology made the regulation of rivers possible, the floodplains have experienced dramatic changes. Today river straightening, bank reinforcements and barrages have taken the natural dynamics out of most rivers and

streams. Stable water levels also prevent the characteristic fluctuation of the ground-water level in the floodplains, which now only follows the dynamics of the river during major events of flooding. Otherwise the fertile floodplain soils are today under intensive agricultural use.

Module Restoration

Water management has greatly improved the water-quality of most rivers during the last few centuries. In the future it will be essential to turn the bordering floodplains into near-natural river landscapes with a high potential for retention. This is especially necessary in the face of the beginning climate change. With a change in the precipitation pattern resulting in wet winters and dry summers it is important to keep the water within the landscape as long as possible in order to avoid a water shortage in summer. That is why, apart from ecological aspects, restoration measures in the floodplain offer protection from floods and low water (cp. SDW 1999).

Module Floods

During the last few years devastating floods have moved the floodplains into public focus. However, the great damages are man-made. Flooding as such is actually an important natural element of the river and floodplain ecosystems. Decreasing river volumes due to the shortening of river channels and shrinking retention areas combined with increasing development of scattered settlements and soil sealing have lead to a fast rise in water-levels during heavy rainfall.

Module Portrait of the Danube

The Danube is the second biggest European river. On its 3000 km course it flows through or borders onto 11 countries. After the fall of the iron curtain it is said to play an important role in connecting the different peoples along its course. The exhibition shall also make allowance for this aspect.

3. Previous knowledge and ideas of the visitors

3.1 Layout of the study

In December 2006 about 450 people in the region of Neuburg, Ingolstadt and Eichstätt were questionnaired. The interviewers werde divided in equal parts of the following groups: adults (over 18 years of age), teenagers (13-18 years of age), and children (under 13 years of age). The survey was done with a questionnaire. The children and teenagers were questioned in schools, the adults on the street and in the auditorium. First the questionnaire checked how much was known about the topics discussed above. Afterwards people were encouraged to choose topics and media that could/should be used for the design of the exhibition centre.

3.2 Select Results

The statistical evaluation of the data showed no significant difference regarding gender and type of school. However, it showed a significant difference regarding age levels. Children did not know the word floodplain or what it means. Consequently, there is no difference for them between a floodplain forest and a forest. With growing age the knowledge increased. Most adults knew the expression floodplain forest and what it means. They were also more or less familiar with more complex topics like river regulation and restoration of rivers. Even locals knew hardly anything about the current regional restoration project.

The adults were the group the most interested in visiting the information centre; two thirds of those surveyed said they would like to visit it. Among the children´s group, still half of them showed interest whereas only one fifth of the teenagers showed a positive reaction concerning a visit to the information centre.

All groups named flooding as the most interesting topic for an exhibition. In addition, adults were especially interested in the floodplain forest eco-system and its protection. For children and teenagers, restoration of the river and the local situation ranged as numbers two and three on the scale of interesting topics. It is interesting to state that the adults showed no special interest in the local situation.

The questionnaire also asked which forms of presentation people would prefer. Again a difference in age was especially significant. All persons showed less interest in texts and maps, while they all showed much interest in an aquarium. Adults were also intrigued by a landscape model, whereas children and especially teenagers were more interested in computer simulations and film presentations.

4. Educational Reconstruction and Realization

The groups of students had the task to work on the scientific aspect of their module and to especially examine the local situation in the project area. On the other hand they had to make educational suggestions for the presentation. The first step was to present the results in a semi-public meeting to the supporting body of the restoration project and to members of local environmental education organisations. The second step was the creation of posters that will be shown in an exhibition. The third step, finally, was to write down the respective scientific analyses of their modules and the educational suggestions for the exhibition at the 'Schloss Grünau'.

4.1 Posters for an Exhibition

In groups the students developped posters for an exhibition that shall be shown simultaneously at the District Office in Neuburg and at the City Council in Ingolstadt in order to introduce the public to the information centre. The exhibitions are to open mid-July 2007. For the design of the posters it was on the one hand important to show the respective scientific facts and connections correctly but simplified. On the other hand, the consequences from the results of the survey as well as general pedagogical principles were incorporated. That is why the groups deliberately dispensed large amounts of text, but made it possible to keep the posters attractive for those who want to know more by building in flaps with more text behind them. Likewise, the use of technical terms was greatly limited.

4.2 Designing the Rooms in 'Schloss Grünau'

The students came up with a real firework of ideas on how to present the contents of their respective modules. These ideas were developed on the basis of the scientific analysis and the results of the survey. In addition the students incorporated ideas from their educational training and from their practical courses at schools, but also from real-life or virtual visits to other information centres. Only some of them are mentioned:
- Module Floodplain Forest Ecosystems: aquarium, diorama, Plexiglas-tubes with alluvial soils
- Module River Regulation: wooden board model, model section, time wheel
- Module Restoration: landscape model, computer simulation

- Module Floods: dimmable floodchamber
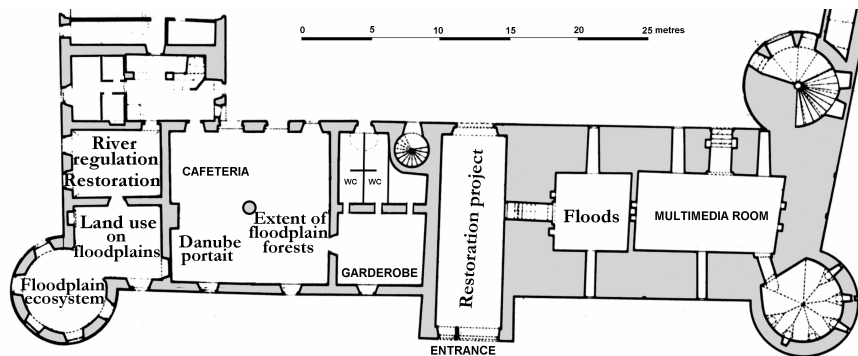
Fig. 2 Use of the premises at 'Schloss Grünau' by the different modules

In addition the students produced ideas for the artistic design (painting, music, poetry) of the rooms for floodplains and floodplain forests. For financial and technical reasons not all suggestions can be put into practice. In June 2007 a discussion with the project managers showed the state of planning (cp. fig. 2). The exhibition is expected to open in spring 2008.

5. Conclusion

From the point of view of the authors the tutorial workshop was a complete success. The students were especially motivated because they knew that the results of their work would really be put into practice. They participated especially ardently, amongst other things, in the preparation and execution of the survey. The educational and scientific training of the students went hand in hand.

Concerning education for sustainable development there was a double effect. On the one hand the students became aware of the principles of education for sustainable development through their work. On the other hand an exhibition is being prepared for potential visitors that includes not only the common principles of environmental education as e.g. the consideration of cognitive, affective and activating aspects, but also includes further principles e.g. social aspects, change of scale, participation of those affected, in the presentation.

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Geography, Education For Sustainable Development And Primary School Curricula: A Complex Triangle.

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Abstract

The aim of this theoretical paper is to reflect on the trans-disciplinary nature of EE and ESD. Considering the proper position of this subject in Primary School Curricula, is trans-discipline an advantage or a limit?
Recent international literature has underlined the difference between Environmental Education and Education for Sustainable Development (Jickling, 2005; McKeown & Hopkins, 2003; Sterling, 2003), developed the theme of sustainability in higher education (Wals & Jickling, 2002) and defined education as a permanent process (Demetrio, 2003). However, in many cases in Europe, Environmental Education has kept its own undefined position in Primary School Curricula. In fact EE is considered to be a cross-disciplinary subject. This transversal nature might generate some epistemological and methodological confusion. This confusion refers to EE issues, goals and didactics, in particular considering the central role played by "best practices". In Primary School EE is often connected with different subjects, such as Geography and Science, supplied with more solid (and older) epistemological bases. This "limit" might even be considered an advantage, because Geography (of course also Science) could be used as an "external support" to validate EE didactics and objects.
Re-reading the International Charter on Geographical Education, some important contribution on geography and epistemology and comparing three National Curricula (the Italian, the French and the English ones), we present a possible way to consider Geography as a support for the "external validation".

Keywords: Geography, Trans-Discipline, Epistemology, National Curricula, Complexity

1. Education for Sustainable Development and Environmental Education

This theoretical paper is the second step of a study on EE epistemology and methodology in Primary Schools. In our first work (Malatesta & Camuffo, 2007) we analysed the connections between EE and Geography in the Italian Curriculum. We chose to work on Primary Schools because it is the fundamental step in the growth of the relationship between the individual and the environment (Sterling, 2003; Lee & Williams, 2001; Giolitto, 1991)

With this paper we have tried to extend the analysis to two other National Curricula (the French and English ones) considering also ESD.

The introduction of ESD has promoted a large debate on the differences between these forms of education (Jickling, 2005; McKeown & Hopkins, 2003; Sterling, 2003). Currently, this is not only an academic debate, in fact the forum launched by IUCN in 2000 (http://www.iucn.org/themes/cec/extra/esdebate/results.html) reveals that researchers, educators and teachers assume quite different positions: many of them consider ESD as the next

generation of EE, which includes issues of ethics, equity and new ways of thinking and learning, while others affirm that ESD should be a part of good EE and guess there is no need to do away with EE as an umbrella (Hesselink et al., 2000).

Although we are aware of the different positions that stress the differences between these two educations, in this paper we have decided to focus more on their similarities, especially for two reasons. Both EE and ESD have a strong emphasis on the interconnections between different perspectives (Haubrich et al. 2007; Sterling, 2003) mainly in Primary School (Le Roux & Thèmines, 2005; Giolitto 1991). Secondly because EE and ESD are included in three European Curricula where Geography is a statutory subject (EE in Italy and France and ESD in England).

We have focused in particular on teacher interpretation of these education because different authors, especially for the English National Curriculum (Chatzifotiou, 2006; Catling, 2001 and 1999), and our daily activity as educators and teacher trainers for Primary Schools, make clear that teachers face strong difficulties when they try to translate into educative actions what is specified in the curricula for EE and ESD.

The lack of a clear definition could represent a great difficulty for the teachers' job, mainly because the formal interdisciplinary nature of EE and ESD (Haubrich et al., 2007) can run the risk of being misunderstood inside the programmes.

2. ESD and EE inside the Italian National Curriculum (Indicazioni Nazionali per i Piani di Studio)

On reading the Italian National Curriculum (*Indicazioni Nazionali per i Piani di Studio* - Primary School from age 6 to age 11) we have focused our attention on three questions. Is the text strictly prescriptive or not? Did the legislator use the expression EE or ESD meaning the study of interaction between people and the environment? What position does EE (or ESD) occupy inside the text?

The Curriculum (www.pubblica.istruzione.it) gives some guidelines that indicate *themes*, *aims,* and *expected standards* for each subject. Although it should not be considered a prescriptive text, it is useful to underline that it specifies some meaningful distinctions.

First of all, the legislator chose the expression *Educazione Ambientale* (Environmental Education) while ESD is never mentioned. EE is included (with other forms of education such as, for example, Sex Education) in a transversal section called *Educazione per la convivenza civile* (Citizenship). The most noticeable point is the clear separation between *Materie* (subjects) like Geography and Science and *Educazioni* (education) like EE or Citizenships. This distinction should help teachers to recognize disciplinary boundaries and to program courses based on the methodological dialogue between subjects and education. But reading the sections dedicated to *themes*, *aims* and *social relevance* of EE, Geography and Science, the separation and inter-discipline we mentioned are reduced to epistemological confusion and to trans-discipline (in the fourth paragraph we will argue the differences between inter- and trans-). Table 1 is a synthesis of the comparative reading we carried out in our first work.

Inside the text, EE occupies a distinct (and innovative) position but in practice its *themes*, *aims* and *social relevance* are the same as of Geography and Sciences which are commonly considered traditional subjects. Even if the text promotes an interesting separation between *materie* and *educazioni*, the latter are not supplied with independent aims and solid epistemological bases. In our opinion, this unclear definition is not just a formal issue, in fact it can generate a significant gap between the theoretical guidelines of the Curriculum and the concrete educative action, mainly in Primary Schools.

Table 1 – EE, Geography and Natural Sciences inside the Italian National Curriculum (Malatesta & Camuffo, 2007)

	Main Theme	*Aim*	*Social relevance*
EE (EDUCATION)	"The human needs and the different uses of environmental resources"	"…understanding the importance of people's actions on their environment"	"…knowledge of natural and cultural heritages in order to respect them"
Geography (SUBJECT)	Human beings and their "activities as a part of the whole environment"	"to recognize the most important links between human and natural systems"	"to suggest solutions about the conservation and the valorisation of natural and cultural heritages"
Sciences (SUBJECT)	Definitions of *Environment* and *Nature* and knowledge of their "relations with human beings"	"To describe an outdoor environment considering its links with people's activities"	"to explain why people must respect environmental resources (natural heritage)"

Source: Indicazioni Nazionali per i Piani di Studio (www.pubblica.istruzione.it).

3. A look at the programmes in France and in England

In this paragraph we extend the analysis to the English *National Curriculum* (www.nc.uk.net) and to the French *programmes d'enseignement de l'école primaire* (www.education.gouv.fr). In order to compare the three texts it is necessary to focus on similar age levels, therefore we have considered only *key stage 2* (end of the key stage at age 11) for the English Curriculum and both *Cycle 2* and *Cycle 3* for the French one.

Two reasons justify this comparative reading:

- Currently Geography is a statutory subject in all three countries at the age level we selected (Chatzifotiou, 2006; Chevalier, 2000).
- The two-year period from 2001 to 2003 represents a crucial passage for the definition of the three National Curricula especially considering the connections among Geography, EE and ESD (Indicazioni Nazionali per i Piani di Studio, 2003 [Italy]; Nouveaux Programmes, 2002 [France]; Educational Act, 2002 [England])

Firstly we comment on the English National Curriculum. Generally speaking the text is not strictly prescriptive, in fact:

"for each subject and for each key stage, programmes of study set out what pupils should be taught, and set out the expected standards of pupils' performance" but, as in Italy, "it is for schools to choose how they organise their school curriculum to include the programmes of study" (www.nc.uk.net).

ESD is presented as a new form of education but it is connected with statutory subjects:

"there are opportunities for pupils to develop understanding of sustainable development within the school curriculum, in particular in their work in geography, science and citizenship" (www.nc.uk.net).

Analysing Key Stage 2 we focused on the strong connection between ESD and Geography, given that the relationship with Science is not clearly defined and Citizenship becomes a

statutory subject only from the third stage. ESD *themes* and *social relevance* are included both in the general notes for Geography ("they find out how people affect the environment and how they are affected by it") and inside a specific section called *Geographical Knowledge and Understandings:*

> "recognise how people can improve the environment or damage it and how decisions about place and environments affect the future quality of people's lives […] how and why people may seek to manage environments sustainably, and to identify opportunities for their own involvement, for example taking part in a local conservation project" (www.nc.uk.net).

We believe that the overlap between themes ("how decisions about place and environments affect the future quality of people's lives"), aims ("manage environments sustainably") and social relevance ("example taking part in a local conservation project") could produce the same epistemological confusion we underlined in Table 1.

In the first paragraph we mentioned the current discussion on differences between EE and ESD, that is a fundamental issue to understand the English National Curriculum. Yet it is equally important to remember that many authors have recently analysed the evolution from EE to EDS in the National Curriculum (Chatzifotiou, 2006; Lee & Williams, 2001; Harris, 1991) and that Athanasia Chatzifotiou has showed the difficulty to separate them clearly in Primary School programme, especially considering their themes and their aims. Her analysis seems to confirm that the lack of definition is one of the most serious issues for teachers and educators working in Primary School in UK (Chatzifotiou, 2006; Rawling, 2001; Lee & Williams, 2001).

Although the structure of French *programmes d'enseignement de l'école primaire* is generally more rigid than the Italian and the English ones, we can affirm that the text is not properly prescriptive. EE is considered a cross-disciplinary education, connected with Citizenship, but formally separated from traditional subjects, like in the Italian Curriculum. The Cycle 2 (from age 6 to age 9) is organized in seven "domaines" which are not real subjects but general thematic areas: for example the expression "découvrir le monde" (discovering the world) that includes geographical, environmental and scientific knowledges is used instead of Geography. EE is already mentioned at this level but the text specifies that "EE will be deeply studied only from the third stage" (www.education.gouv.fr), where traditional subjects such as Geography and Science and Technology are well defined. Looking at the programmes for Cycle 3, we have read that the general aim of Geography is "to understand how people occupy, use and manage their territories" (www.education.gouv.fr) and that EE is not included as a geographic topic, at the same stage, but it is rather considered one of the key-points of the scientific programme. This condition suggests again formerly discussed confusion between education and subjects. In fact the text declares that "EE is transdisciplinary" but its specific themes ("the complexity of the environment and the human actions on it"), its aims ("a scientific knowledge") and its social relevance ("critical choices and ecological approach") are included in the section dedicated to *Sciences and Technology*, one of the oldest disciplines in the French Curriculum (Graves, 2001; Chevalier, 2000).

Three general considerations emerge from the synthetic readings we have proposed.

First of, all the texts indicate programmes, themes and expected standards but allow schools and teachers to choose how to organize their courses and how to promote the interdisciplinary dialogue. Formally this could be the ideal setting, but to realize this dialogue it is necessary to bear in mind that:

> "the national curriculum, and the teachers who deliver it, are [the] two fundamental elements of successful school performance. The former makes the necessary provision while the latter exercise their expertise to deliver these provisions" (Chatzifotiou, 2006, p. 367).

We think that the "provisions" made in the National Curricula should be firstly epistemologically clear and easy to "deliver".

Secondly, it is useful to remember that in the three curricula the study of interactions between the environment and human communities is defined in different ways, but also that, reading the programmes, this difference is not so relevant. In fact, even if Italy and France are still bound to the former expression 'EE' while the English text uses the expression 'ESD', themes and objectives are essentially the same in the three curricula.

Finally, analysing the position of EE and ESD in the programmes, we have found a meaningful opposition. In general they are considered transversal knowledges (separated from traditional disciplines) and occupy a cross-disciplinary position (in England between Science, Citizenship and Geography, in Italy as separate *Educazioni*, in France between Citizenship and Sciences), but their aims and social relevance are always included in the geographical (or the scientific) topics; they seem to be, as Athanasia Chatzifotiou argued, in an undefined position.

4. Interdisciplinary or Trans-disciplinary?

The connection we discussed at the end of the third paragraph forces teachers to look for EE and ESD themes inside the Geographic and Scientific programmes. Using a metaphor we could affirm that, in the National Curricula, EE and ESD are already dependent on old and "old-fashioned" traditional disciplines. This is evident mainly in the French and Italian cases where Geographical education has a long history (Squarcina, 2005; Graves, 2001), but also in England where the *Statutory Order for Geography* was published only in 1991 (Rawling, 2001). This subordinate condition gives Geography (and of course Science) a high level of responsibility. Those "old disciplines" should supply the new forms of interdisciplinary knowledge, not only from the theoretical point of view but also in their didactic actions. In fact teachers who have to think and to organize EE and ESD projects will get epistemological bases and thematic indications directly from the programmes. We guess that a discussion on responsibilities of Geography in Primary School should spur European Geographers on; mainly in Italy, where our discipline seems to have been forgotten inside High School, but also in England and Wales where for many years it "has not been recognized as a significant frontline contributor to the curriculum" (Rawling, 2001, p. 139).

In the second paragraph we referred to the difference between inter- and trans-. Fundamentally that is an opposition between the formal interdisciplinary definition of EE and ESD (par.1) and their real cross-disciplinary positions inside the texts. In fact, while programmes for Primary School recognize "interdisciplinary qualifications" (Haubrich et al., 2007), these qualifications seem to be limited by the indeterminate role played by EE and ESD. This ambiguity can be defined as *"trans-discipline"*. We do not refer directly to the international debate on transdisciplinary (Brand et al., 2004; Nicolescu 2002) but specifically to the Latin prefixes *inter* and *trans*. *Inter-discipline* means the transfer of methods (or views) from one thing (a discipline) to another, it overflows the disciplines but keeps their own aims and goals; while *trans-discipline* is something that is among different disciplines but is also beyond each one, it concerns position more than meaning. The first one is a connection while the second one suggests the idea of a new place. Potentially, trans-discipline is a great source for the study of environmental complexity, but the point is that it could currently represent for Primary School teachers an insurmountable dilemma, mainly for two main reasons.

The first one concerns the traditional distinction between education *about*, *in* and *for* the environment (Lee & Williams 2001; Lucas, 1980). Working as teacher trainers we noticed that this unclear epistemological definition can deprive EE of its educational value (its holistic view on *complexity*) and reduce it to a simply didactic activity *in* the environment, or in the best case *for* the environment (Malatesta & Camuffo, 2007), as, for example, more recycling garbage labs and outdoor excursions.

Secondly, if texts suggest a kind of thematic overlap between subjects and education, EE and ESD run the risk of being considered only operative phases in the Geographical (or Scientific) education. We believe that this holistic approach, conceptually attractive, can support "the

neglect of EE (that is a concrete risk also for ESD) as a serious curriculum component" (Lee & Williams, 2001, p. 224).

After comparing the three curricula we are convinced that none of the solutions proposed helps to completely avoid these risks. In fact, the separation between education and subjects seems to be just a formal definition (like in Italy), while the debate between the "scientific" view on EE (like in the French programme) and the humanistic view on ESD simply divides natural aspects from social ones and reminds us of the popular " hard versus soft" distinction, dangerous more than useless at this level. Finally we consider a definition that transforms EE and ESD merely into topics (or aims) of other disciplines (Malatesta & Camuffo, 2007) unacceptable.

5. Geography as "external support" for EE and ESD

The recent *Declaration On Geography Education for Sustainable Development* underlines the important connection between ESD and Geography. It declares that:

"there are interdisciplinary qualifications, which shall be developed in collaboration with other subjects" for example "to perceive problems and phenomena from different perspective […] to relate local experiences to global phenomena" (Haubrich et al., 2007, p. 4).

Let us focus on the expression *in collaboration*. Collaborating means the very opposite of being subordinate; collaboration presumes a dialogue and a dialogue needs the clear definition of all the speakers. In the text we examined subjects that are not in a collaborative condition: EE and ESD (in this case distinction between them is not influential) are presented as not-specified cross-cultural knowledge or, even worse, as aims of the Geographical (or of the Scientific) programmes; remembering the difference between trans- and in- (par. 4), this formal issue becomes a meaningful point.

Our experience has shown us that currently the most difficult quest for Primary School teachers is to find a balance between subordination (that depends on the weak definition we criticized) and collaboration, and to understand how traditional disciplines can dialogue with new education instead of being only boxes that list topics and aims.

This supporting role directly concerns the responsibility of Geography which we discussed in the third paragraph. During the 20th century some geographers recognized this value defining our discipline as dialogic knowledge, as a science that traces connections and relations (Hartshorne, 1959) among different possible worlds (Dematteis, 1990). In the early nineties Adalberto Vallega restated this idea arguing that "Geography is legitimized only if contributes to analyse relationships between subjects and objects and to study the *complexity"* (Vallega, 1990, p. 181). He considered this support not only from the theoretical point of view but as a concrete possibility, introducing the idea of *validazione esterna* (external validation). His aim was to legitimize the social role of Geography as an ideal field for the interdisciplinary debate; more modestly, we would show Primary School teachers how to get over the confusion and the weak level of definition we argued. The first step is to think of Geography as an "external" epistemological basis that can validate EE and ESD projects and didactics. We are sure that it was also the legislators' thought, but it is not so evident if we read texts where EE and ESD are just simple topics of "real" subjects like Geography and Sciences.

At the same time it is necessary to promote the reading of documents among teachers, like the revised edition of *The International Charter on Geographical Education*, and frameworks which can supply the National Curricula with a fundamental body of epistemological reflections.

6. Conclusions

This paper has attempted to raise some issues for further debates and research on the connection and disconnection among Geography, EE and ESD. The aim was to understand if the weak elements that emerged from our analysis of Italian Primary School programmes (Malatesta & Camuffo, 2007) could be considered common topics also in other European Curricula where Geography is a statutory subject. Both the undefined position of these new forms of education and the need to bear in mind the responsibility of traditional subjects have been confirmed by our synthetic comparison. We have focused mainly on our discipline as "external support" not because we forgot the role played by Sciences, but because we agree with Demattei´s and Vallega's ideas of Geography as support for the interdisciplinary dialogue, especially in Primary Schools. In our next research we hope to find methods with which to proceed in this validation process. However, we are already convinced that this aim will be accomplished only by working on teacher training programmes, focusing on their Geographical knowledge more than on methods and didactic techniques.

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Does Geography 'Really' Contribute To ESD? : Critical Reflections On Meta-Geographical Frameworks In World Geography

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Abstract

Every global consideration of human affairs deploys a meta-geography. Dividing the world into several regions may be convenient and essential starting points for learning the map of the world. But not only does it do an injustice to the complexities of the real world but also leads to fundamental misconceptions in ESD. The binary distinction between the rich North and the poor South, like that between the First and the Third Worlds, is essentially defined in economic terms and deeply rooted in the ideology of developmentalism and western hegemony. Critical analysis of the meta-geographical frameworks reveals how imperative it is to deconstruct the taken-for-granted spatial categorization and taxonomy that surround us. Constructing a more relevant spatial vocabulary through the geographical imagination could be the next meaningful step to grasp complexities and interconnections of the real world without losing sight of the broad picture. An international dialogue for reforming the problematic conceptualisation of the world and developing an alternative meta-geographical framework could be initiated and expedited by geography educators.

1. Why is Meta-geography Important?

Every global consideration of human affairs deploys a meta-geography. Lewis and Wigen (1997, p. ix) define meta-geography as "the set of spatial structures through which people order their knowledge of the world". Meta-geographies are much more than just the ways in which societies are stretched across the earth's surface. They also include the contested, arbitrary, power-laden, and often inconsistent ways in which those structures are represented epistemologically. A question of meta-geography also leads us into the realm of visualization, for meta-geographies could mean pictures and visual images as well as maps.

2. Conventional Meta-geography in ESD

Dividing the world into several regions may be convenient and essential starting points for learning the map of the world. However, not only could it do an injustice to the complexities of the real world but also lead to fundamental misconceptions in ESD. Popular meta-geographies to categorize the world - First/Third Worlds and North-South dichotomy- seem to be taken-for-granted in global environmental discourse. However, critical approaches to meta-geography should be applied in a sense that maps are products imbued with various power and knowledge systems. Especially, the broad contexts of map production should be considered in association with Western imperialism.

2.1 The First / Third World

Conventional meta-geography draws a distinct line separating the 'developed' First World and Second World from the 'less-developed' or 'underdeveloped' Third World. The term 'Third world', coined by the French demographers Sauvy in 1952, has evolved into a concept of development (Calvert & Calvert, 1999). Partitioning the globe into First, Second, and Third Worlds is anachronistic since the political criterion used to defined the Second world, government by a communist regime, has disappeared. The fact this categorizing scheme, which served the ideological needs of the Cold War era but is still in use without revision, reflects serious inertia with academia. Moreover, this classification system is problematic as a politico-economic category in a sense that the Third World is unduly monolithic and its boundaries too simply drawn (Lewis & Wigen, 1997). Such controversial and erroneous distinctions seem to be based on residual Euro-centric continental thinking as well as a failure of reflecting the updated data on changing national fortunes. Regardless of their actual circumstances, the countries in Europe including the relatively poor nations of Portugal and Greece are often considered 'developed' by definition since Europe is a wealthy continent. While Singapore, Hong Kong, and South Korea are categorized as Third World, despite their economic dynamism.

2.2 The North / the South

The North-South binary is essentially defined in economic terms like that between the First and Third World. The North-South distinction has gained popularity as a preferred alternative scheme, distinguishing the developed North from the less developed South. Calvert and Calvert (1999) who used the title with the north/ the south in their book acknowledged that the term 'South' is misleading in a geographical sense and the usage of it is very problematic. However, they insisted that "the great merit of the term is that it does not have an attached suggestion of value, or lack of it" (Ibid, 5p). Their assumption seems to be so naïve and should be examined more thoroughly. The category of the North was originally based on the notion that industrial economies of the Soviet Union, Europe, Japan, and North America were fundamentally similar. 'The South' has emerged comparatively recently as a synonym for what was formerly called the 'Third World'. The North-South scheme is fantastically simple and it contains many fundamental problems: It doesn't seem to reflect any regional disparities in a country how large it is or provide a proper geographical sense of location such as the northern/southern hemisphere. China where one person in four of the world lives is routinely placed within the South without a refined examination, while Australia and New Zealand are commonly grouped with North in spite of their location in the Southern hemisphere. The North-South scheme seems to be also associated with the imperialistic tradition when considering almost all Southern countries are former colonies except for China, Thailand and Iran (Calvert and Calvert, 1999, p. 6). The South needs to be more differentiated considering that levels of development in the South vary so much and the term has different meanings to different people and organizations.

2.3 Beyond the Binary Categorization

Lewis and Wigen's critique of meta-geographies (1997) reveals how earlier notions of world geography as a neat series of continents tends to disguise both an implicit environmental determinism and a blindness to the politics of space as a social construction. Ahmad (1992) who traced the origin of the first/third world terminology examines cogently the confused thinking upon which the concept of the Third World ultimately rests. Escobar (1995) examines how Western intellectuals construct the category of the Third World and he argues that

the resulting geographical image universalizes and homogenizes Third World characters without a historical consideration. McDowell (1993, p.313) argues that our conventional practice of mapping the first world/ third world dichotomy not only embodies imperialist assumptions but is also an increasingly inadequate portrayal of the world's socioeconomic geography. The notion of the First world seems to be deeply rooted in the distinct Western academia realm defining nine-tenth of the world population in a single negative term, the Third world. Smith (1999) argues that the representation of the 'Third World' in the UK school curriculum was framed by the needs and ideology of imperialism.

The binary distinction between the rich North and the poor South, like that between the First and the Third World, is essentially defined in economic terms and deeply rooted in the ideology of developmentalism and western hegemony. Even critical theorists trying to imagine a post-development era, ironically, repeat the rhetoric based on the conventional stereotypes of the Third World and problematic categorization of North and South (Laurie, 2005). Radical environmentalists also tend to take too simplistic approaches insisting that the ecological problems of the contemporary world are entirely from the North in origin with the South becoming deprived only through a process of modernization (Calvert & Clavert, 1999).

3. Unpacking the Meta-geography: Does Geography really contribute to ESD?

Critical analysis of the meta-geographical frameworks employed in school textbooks, popular atlases and journalistic treatments reveals how imperative it is to deconstruct the taken-for-granted spatial categorization and taxonomy that surround us (Lewis & Wigen, 1997). We should acknowledge that the meta-geographical framework employed in geography education has deep roots in European cartography. We also be critical about the modes and metaphors of representation within which environmental and developmental discourse are framed because these rhetorics can dehumanize and decontextualize the world.

3.1 Euro-Centrism

In physical, cultural, and historical diversity, both China and India are comparable to the entire European landmass, not to a single country in Europe. Lewis and Wiegan (1997) argues that conventional meta-geographical categories make more plausible the notion of Europeans' superiority in the history of human affairs, functioning as visual propaganda for Euro-centrism by elevating Europe's position on the world map. Critical analysis of the meta-geographical frameworks shows that Europe and the United States appear in swollen importance, while the rest of the world is shrunk into a small dormant place that awaits modernization (Chakrabarty, 2000). Africa, Southeast Asia, South Asia, Latin America and Middle East are categorized as the South, the Third World or Less-developed/developing country group. By continuing to employ Euro-centric meta-geography uncritically, even in the academic community to promote ESD, there seems to be a danger to perpetuate a problematic conception of the earth. Authentic ESC demands a more honest, ecumenical and accurate meta-geography.

3.2 Developmentalism

Development was often understood as modernization along the lines followed by the global North during the post-war period. The idea of modernization is mostly based on the experiences and values of western countries and they were eager to provide technical assistance to overcome perceived absence or development obstacles within southern countries through

large-scale project. Escobar (1995) traces the discursive creation of the Third World as both the needy object of international development intervention and the excuse for expansion of a new world power's mode of global governmentality. He considers why the Western mind-set defined the Third World as a miserable world of poverty, disease and backwardness that has to be mended by infusion of Western capital and technology. Robinson (2003) argues that western geographers tend to be caught up in the developmentalism by mapping the world into First/Second/Third-world zones in terms of knowledge system as well as meta-geographical framework. The local communities in the Third World seem to be stigmatized as backwardness, outside, behind and beneath the transcending fast lanes of modernization and then globalization. However, development could have many faces in diverse contexts/scales, different places and even times. World historians have recently claimed that the great divergence between Europe and Asia occurred only after 1800, and that before that date, the most advanced parts of Europe and Asia should be seen as on the same development level, with multiple cores and shared constraints (Broadberry et al., 2006; Frank, 1998).

3.3 Lack of Geographical Literacy and Accuracy

A strong concern for geographic education and literacy has emerged. The recent revival of interest in geography, particularly in light of the complexities of post-Cold War and ethnic-based geopolitics, has made geographic understanding all the more significant. Given the abysmal, embarrassing, and widespread ignorance of world geography among students in the western countries, pedagogic representations of the world's peoples and places could be an urgent issue (Lewis & Wigen, 1997). Moreover, very few of them seem to be in a position to interpret regional schemes critically. The most serious problem is that the global rhetoric employed by politicians and major international organizations, reflects distorted meta-geographical categories inherent as instruments of ideological power (Cameron & Fairbrass, 2004). Even Department for International Development, major stakeholders and transmitters of a public face of development in the UK, seems to repeat the similar fallacy of meta-geography in spite of its good intention. The conventional meta-geography, North-South distinction seems to be employed by DFID. If it wants to fulfill its grand ambition, it would better address global issues including environmental problems based on a geographical literacy based on critical meta-geography.

> DFID will ... enhance understanding of **the nature, cause and consequences of poverty, inequality, injustice and environmental degradation**... increase understadning of our rapidly-chancing, interconnected and interdependent world and of the links between **the lives of people in the United Kingdon and the South**. (DFID, 1998, p.1)

4. Power of Geographical Imagination: Beyond the Binary

Constructing a more relevant spatial vocabulary through the geographical imagination could be the next meaningful step to grasp complexities and interconnections of the real world without losing sight of the broad picture.

4.1 Provincialising Europe: Fair Meta-Geography

Europe seems to be rather a sub-region of Eurasian Continent than a continent. European continent is a social construct and the distinction between Europe and Asia has had many uses throughout history, including different sides of the Aegean Sea, the Catholic and Orthodox realms, Christendom and the Muslim world (Lewis & Wigen, 1997). Ostensibly "clear cut"

boundaries such as the Urals, which separate European and Asian Russia, reflect changing political interests, particularly the desire to naturalize certain distinctions in the name of imperial expansion. Thus Europe as a separate region was largely a construct essential to the emerging hegemony of European culture and power (Pickles, 2005). Europe seems to enjoy favorable attention in terms of area and population in world history and geography education (Chakrabarty, 2000). In fact, Europe occupies only 10 Mkm², while Asia 44 million km² and Africa 30 M km². In terms of population, 60 percent of world population lives in Asia but only 11 percent of it lives in Europe. The time has come to restore some balance by putting Europe in its place, from the core to a province both in material and intellectual terms, and downgrading its over-estimated geographical significance through would geography education sensitive to the critical meta-geography. To develop a fairer meta-geographical framework is quite important for ESD in terms that it can provide more accurate understanding of the global environment and concrete reality conducing to responsible actions for sustainable development.

4.2 Diversifying Developments: Post-Developmentalism

Development is diverse, complex and often contradictory and the real-life experiences of people and the diversity of the minute local contexts should not be despised. A revival of regional studies could be also an extremely important step towards producing a postcolonial sensitivity in geography. Unpacking development involves new perspectives on the development process and listening to other voices in the South. Escobar (1995) tries to imagine a post-development era and commends various defenses of the local, especially by women's, ecological and people's organization, for breaking the holds of Westernization and an ideology of modernizing development. In this process, a recasting of "Areas" or "Regions" within a new geo-politic world could help redraw the boundaries of the regions we consider relevant. Under the post-development thinking, the Global North/ First world may be expressed as 'over-developed' or 'environmentally/socially poor' area. Rethinking development means reexamining the categories in development discourse and revealing the political, cultural and institutional relations that shape them. Post-colonial perspectives encourage us to map out a more complex geography than a world divided into first/third world, North/South, and to rethink western development and modernism. Ravenhill (1990) proposes an economic reclassification of the South that would yield five new categories including high-income oil exporters and industrializing counties with strong states and low debts to describe the status more acutely. Moreover, new strategies and perspectives need an alternative meta-geography, one of networks rather than the mosaic of states (Beaverstock et al., 2000). Considering that economic cores in the contemporary world such as World Cities exists in a world of flows, linkages, connections, and relations, the emphasis on the transnational connectedness of regions and places would be a possible tactics to avoid the fallacy of imperial mapping and stereotyping (Robinson, 2003, p. 279).

4.3 Weaponizing New Geographical Technologies

Until the early 1990s, GIS, cartography, and remote sensing had been regarded as the study and application of techniques for collecting, managing, analyzing, and visualizing data to update maps. However, there has been a push for the development of GIScience and the growing engagement of GIS and critical cartography with environmental issues and political concerns as computers have evolved from being tools to study the world to becoming an integral part of the world (Sui, 2004). By integrating new technologies with creative imaginations, geographers and geography educators can provide more innovative and globally relevant perspectives about sustainable development. Everyday mapping to challenge the general-

ized global perspective, counter-mapping for conservation and participatory GIS such as indigenous/community-based mapping and engaging marginalized groups in mapping through geographical literacy education can be examples that show the power of critical cartography based on new technologies (Crampton & Krygier, 2006). The photographs from space satellites can also influence meta-geography of the public or the spatial structures through which people order their knowledge of the world. Cosgrove (1991) observed that the euro-centric nature of maps could be minimized through the view of Earth from space. "The photo decentres Europe and the Atlantic, to the advantage of Africa, the least significant of all the continents in the conventional system… thus, our most familiar global image today privileges the Third World and the South (1991, p.127)".

5. Geography 'really' matters for ESD!

Educators who want to promote ESD should become much concerned with the issues of language and representation and make a critical reflection on the meta-geographical frameworks embody biases, naturalize contingent economic relations, and emphasize some political perspectives while marginalizing others. While deconstructing the received faulty metageography is essential, it is only the first step. An international dialogue for reforming the problematic conceptualization of the world and developing an alternative meta-geographical framework could be initiated and expedited by geography educators. At the same time, serious efforts should be made to improve textbooks and classroom materials, as well as various maps with a critical meta-geographical sensibility.

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Placing Sustainable Development In The Curriculum Of A Cultural Geography Course In The United States

Waverly Ray (Oceanside)

Abstract

Inspired by the United Nations Decade of Education for Sustainable Development, postsecondary students in China, Germany, and the United States participated in an international learning collaboration. Adaptations to the Online Center for Global Geography Education's Population module incorporated content related to sustainable development. The four week, web-based collaboration included approximately 25 postsecondary students from each country. Students in the United States were enrolled in a cultural geography course offered at a community college, which is a public, two-year postsecondary institution which offers programs that lead to an Associate's degree. The pre- and post-test method measured change in American students' knowledge and attitudes toward sustainability as well as geography's role in sustainable development.

Keywords: Community College, Introductory Geography, Higher Education, International Collaboration, Education for Sustainable Development, Sustainability

1. Introduction

In an effort to focus international attention on issues of sustainable development, the United Nations General Assembly declared 2005-2014 as the Decade of Education for Sustainable Development (United Nations Educational, Scientific, and Cultural Organization 2004). While the declaration's full impact on geographic education is not yet known, there is evidence that geographic educators have the potential to offer contributions to the educational goals related to education for sustainable development (ESD). Geography is particularly well suited for addressing the desired outcomes of ESD since:

> Those who are ignorant of basic geographic principles also have little knowledge of environmental potentials and limitations. Under these circumstances, how can they possibly be expected to make enlightened decisions relating to the use and sustainability of our finite global natural endowment? (Gritzner 2003, p. 90)

The broad goals of education for sustainability (ES)—understanding the interdependence of life on Earth and the effects of personal and collective decisions—were developed in the 1990s under several terms, including *education for sustainability, education for a sustainable future*, and *education for sustainable development* (Palmer 1998). In the United States, ES has roots in environmental education, but now spans numerous disciplines (Santone 1999). Many describe ES as a process rather than as a prescriptive measure for meeting the challenges of a "globalized" world (Council for Environmental Education 1999; Koutsouris 2000). Ethical motivation, environmental and active citizenship, critical thinking skills, and reflection are all desirable outcomes in ES (Koutsouris 2000).

Sustainable development and sustainability are loosely defined terms open to multiple interpretations. The United Nations Brundtland Report defines sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development on the United Nations 1987, p. 43). Many definitions of the two terms reflect a forward-looking attitude. Herremans (2002) defines *sustainability* as a process capable of being maintained over the long term and maps sustainability at the intersection of economic, social, and environmental values. Wilbanks (1994, p. 543) explains that "by pulling a variety of agendas and subject-matter under one umbrella, it forces us to confront the possibility of profound choices among environmental, economic and social goals."

These profound choices are met with skepticism, criticism, and reluctance. Some conclude that the terms sustainability and sustainable development are oxymorons. Palmer (1998) indicates that use of these terms is politically-charged, which deters from productive dialogue about the underlying economic, environmental, and social issues. Others note that sustainability is too abstract and unproven since there is little certainty about how a sustainable society would function (Filho 2000; Scott 2002). While distinctions of the meanings and geographic usage between ESD and ES are noted in the literature (Eflin and Ferguson 2001), this research is not focused on distinguishing the terms.

2. International Collaboration

Participants in the international collaboration include approximately: 21 students in an undergraduate Ecology, Economy, and Environmental Education class at Weingarten University of Education in Germany; 27 undergraduate and graduate students in a Theory of Geography Curricula and Environmental Education and Education for Sustainable Development course at Beijing Normal University in China; and 28 students in an undergraduate cultural geography course at MiraCosta College in the United States. Students were assigned to seven international teams with three or four students from each country in each team. Students utilized Google Groups, a web-based discussion application, to communicate with their local and international teammates. The collaboration lasted from the end of April to the end of May, 2007.

The author instructed the cultural geography course at MiraCosta College, which is a two-year community college in North San Diego County (California, US). Approximately 7,000 students attend MiraCosta's main campus, all of which are commuters (MiraCosta College 2005). The majority of the students in the cultural geography class plan to transfer to a four-year college or university to obtain a Bachelor's degree. Approximately 20% of the students enrolled in the cultural geography class consider their home country outside of the United States, which demonstrates the diversity of student backgrounds typical at American community colleges.

The four-week international collaboration adapted the Population module (available from http://www.aag.org/Education/center) of the Center for Global Geography Education (CGGE). The students completed Lessons 1, 2, and 4 of the population module and then completed a newly created Lesson 5 related to sustainable development. The first discussion board activity helped to orientate students to the web-based technology and to introduce the students to their international team members. Each lesson, including the new Lesson 5, lasted for about one week.

Lesson 5, entitled "How is Sustainable Development Practiced around the World?", included content related to the multiple interpretations of sustainable development, Agenda 21, and

indicators of sustainable development. The learning outcomes for Lesson 5 included: a) to apply geographic concepts to sustainable development issues; b) to describe international trends in sustainable development; and c) to evaluate contrasting views about sustainable development. For Lesson 5, students read an online summary about sustainable development and completed two collaborative activities. In the first activity, students calculated their ecological footprints from http://www.myfootprint.org/ and then discussed their footprints. For the second activity, students prepared a statement of how sustainable development is practiced in their country and shared this information with their international teams. The collaboration ended with a discussion of how sustainable development is practiced throughout the world.

3. Methods

Using the evaluation process developed by Klein (2005), the cultural geography students completed pre- and post-tests modified from the CGGE project evaluation. The pre- and post-tests consisted of two parts—the first part assessed student attitudes and the second part assessed student content-based knowledge. The pre-test assessment of attitudes included 35 affective Likert statements, including new items related to environmental perceptions adapted from previous questionnaires administered by Leiserowitz et al. (2005), Sudarmadi et al. (2001), and Uitto et al. (2004). The post-test assessment of attitudes also added two items related to student enjoyment of the international collaboration (i.e., would the student recommend a course with an international collaboration to a friend). The content-based section contained 13 questions related to population geography, of which five questions asked students to define sustainable development and identify indicators of sustainable development. Additional items probed students' awareness of environmental issues at the neighborhood, city, and federal levels.

Of the 29 attitudinal pre-tests administered prior to the collaboration, only 20 students completed valid post-tests, representing a rate of nearly 70%. Of the 29 content-based pre-tests administered, there were 28 valid post-tests returned.

4. Findings

Paired sample t-test analyses did not provide statistically significant results for the 16 affective items related to environment and sustainability issues. It is assumed that the brevity of the collaboration's focus on sustainable development, as well as the difficulty in unraveling social and political constructs of sustainable development, contributed to the lack of statistically significant results.

A qualitative analysis of the content-based questions indicated content gains in students' knowledge of sustainable development. These findings echo previous studies that address the limited understanding of environmental issues by undergraduate students in the United States (Wolfe 2001). For purposes of the analysis, an unanswered question was assumed to indicate a lack of understanding of the topic; however, this may not have been accurate in each case.

After the international collaboration, students demonstrated the ability to define sustainable development and to identify places in the world where sustainable development is taking place. Prior to the collaboration, only two students were able to define sustainable development whereas after the collaboration 21 students successfully defined sustainable development. Interestingly, only two of the students who successfully defined sustainable development after the collaboration indicated the importance of scale when addressing sustainability

issues. While only two students identified where sustainable development occurs prior to the collaboration, 21 students after the collaboration identified places where sustainable development occurs.

After the international collaboration, students were more aware of environmental pollution sources in their neighborhoods, cities, and country. Figure 1 presents the cultural geography students' (n=28) responses to the items asking what kinds of environmental pollution sources are in their neighborhoods, cities, and country. Figure 1 illustrates the increase in environmental awareness after the international collaboration. (If a student listed more than one environmental pollution, all of that student's responses are tallied in Figure 1). Fourteen students did not complete the items related to environmental pollution sources before the international collaboration, while only four students did not complete these items after the collaboration.
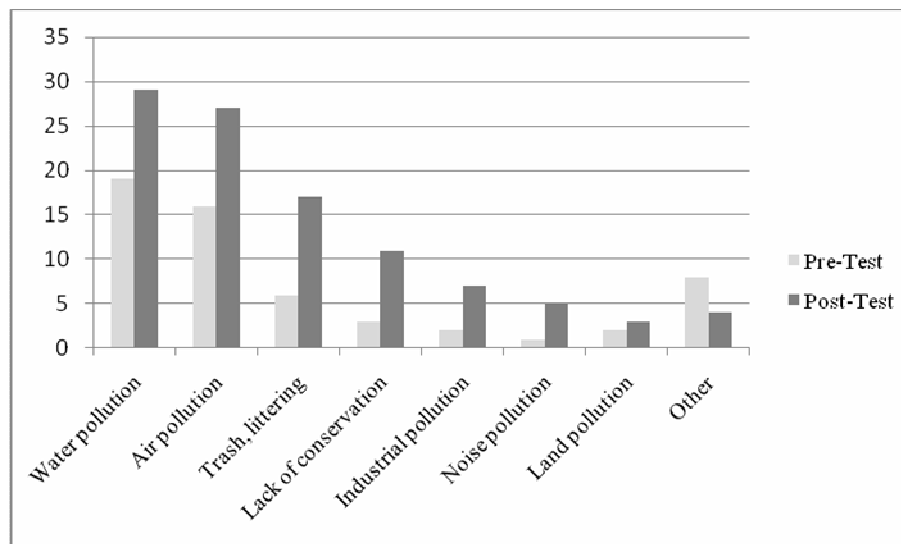
Figure 1. Students' Perceptions of Environmental Pollution Sources

In response to the question *what do you think were the advantages and disadvantages with discussing your investigations about population growth with your international team?,* many of the cultural geography students discussed the benefits of learning about different perspectives. Disadvantages identified by the students included time delays, restrictive objective discussion questions, and language barriers. These disadvantages reinforce Klein's (2005) evaluation of the CGGE modules. Klein and Solem (forthcoming) address these challenges in their recommendations to improve the CGGE modules. Despite the challenges to the international collaboration, the vast majority of the cultural geography students indicated that they would recommend a course with an international collaboration to a friend.

5. Conclusions

Although students in the cultural geography course demonstrated content gains, changes in attitudes toward sustainable development did not surface. Based on these results, it is evident

that more than one week of the four week international collaboration needed to focus on sustainable development in order to strengthen the role of geographic education in issues of sustainable development.

There are numerous opportunities for further research, including comparisons of the results of the students in the United States to the results of the students in Germany and China. Also needed are investigations into the utility of the geographic perspective to broaden students' understanding of sustainability and sustainable development. Perhaps most needed are studies that link geographic education, ESD, and changes to student behaviors.

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Education On Landscape: Theoretical And Practical Approaches In The Frame Of The European Landscape Convention

Benedetta Castiglioni (Padova)

Abstract

The first specific measures that the European Landscape Convention proposes in order to "achieve sustainable development" are devoted to "awareness–raising" and to "training and education"; each Country has to "undertake to increase awareness" and "to promote […] school and university courses". Considering the strong link existing between landscape issue and sustainability, landscape education is considered as one of the possible paths in ESD.
The paper deals with objectives, strategies and methods of landscape education in its connections with the features of ESD. The theoretical point of view is put in relationship with some examples of national and international projects and practices, in geography teaching and in other formal and informal contexts.
In particular the author presents the Cultura2000 European project 3KCL – Karstic Cultural Landscapes as a best practice for education on landscape. In this project nearly 600 pupils of different school level in three areas of Italy, France and Slovenia approached their neighbouring landscape, got to know it through activities carried out with an interdisciplinary staff of researchers, and disseminated their results through a travelling exposition and the web site. The project's theoretical frame, structure and methodology, coherently conceived, present some interesting peculiarities: the strong relevance of the relationship dimension, at different levels; the scientific and critical approach to the complexity of landscape; the contemporaneous relevance given to the emotional approaches, as a medium for a deeper and wider knowledge; the strong co-operation among researchers, teachers and pupils, oriented to a common aim; the both local (due to the focus on the neighboring landscape) and global dimension (due to the international perspective of the project). The project results can help in defining some guidelines for education on landscape, towards a higher relevance of landscape issue in the educational context.

Keywords: Education on Landscape, Landscape and SD, Best Practice, Karst Landscapes

1. Landscape and sustainability

The European Landscape Convention, a recent very important document, is a point of reference that cannot be omitted by people who have interests, in a wide sense, concerning landscape: geographers, of course, and scholars of other disciplines with a mostly cognitive approach, but also for landscape architects and planners, with an applied approach. Local administration and common people are involved in the implementation of the Convention, too.
The general aim of the Convention is to "provide a new instrument devoted exclusively to the protection, management and planning of all landscapes in Europe". The long preamble explains the normative as well as the scientific and social frame in which the member States of the Council of Europe signatory act: many focal points are underlined, among them one of the firsts states "Concerned to achieve sustainable development based on a balanced and harmonious relationship between social needs, economic activity and the environment".

Which are the links between landscape and sustainability? In which sense deals protection, management and planning of landscapes with sustainable development?

Some other statements of the Convention help in explaining these questions, beginning from the definition at the Art.1: "*Landscape* means an area, as perceived by people, whose features is the result of the action and interaction of natural and/or human factors": in this sense, landscape is not only conceived from an ecological point of view, but it involves human (historical, cultural, economic, social, etc.) aspects as well as non-material characters arising from perception. Landscape is a part of our heritage, a resource we inherited from our past and we have to care about, towards our future. Moreover, landscape contributes in determining well-being of people and consolidating territorial identities.

With the same perspective of the most recent documents concerning SD (i.e. the Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice on Environmental Matters, mentioned in the preamble), the European Landscape Convention gives high importance to people. If the involvement of people lays at the very beginning, in the landscape definition itself, landscape "protection, management and planning entail rights and responsibilities for everyone" and each action towards landscape has to take into consideration people aspirations. In addition (and this is our main interest in this case), to underline the importance of an effective participation, the first specific measures that countries have to undertake (art. 6) are devoted to "awareness-raising" and to "training and education".

Many researchers are implementing in different ways (like both landscape and sustainability can be approached in different ways) this strong link between landscape and sustainability (see Antrop, 2005) proposed by the Convention. Among them, the idea that landscape can be considered as a medium between people and territory is growing up, this is a key to understand and to implement in a sustainable way the relation between the population and environmental and spatial context (Castiglioni, De Marchi, 2007). From this wide-ranging approach to landscape, the peculiarities and values of education on landscape arise.

2. Education on landscape: aims, values, examples

Using the metaphor of the "theatre" (Turri, 1998) in which people play the role both of the actor and of the audience towards landscape, landscape itself can be considered as "interfaccia tra il fare e il vedere quello che si fa" (the medium between making and looking at what we made); in this perspective, to achieve a positive relation with the environment and with man-made landscape change, learning to see represents the requirement for learning to act.

Education on landscape concerns different dimensions of human life: the sensorial (in particular visual) dimension, as it can be considered as an "education of the sight"; the cognitive dimension, for its "explorative" character, towards a better comprehension of natural as well as human aspects and factors; the ethic dimension because – as noted above – it involves the responsibilities of human actions in the landscape itself; the social dimension, as landscape belongs both to the single person and to the communities that live in it and that perceive it.

In particular Zanato (2007) underlines three different functions of landscape in a pedagogical context:

- *hermeneutical function*, because we can learn to "read" inside it and through its signs;
- *pragmatic function*, for its essential project dimension, that inquires on responsible management of landscape change;
- *social function*, for it involves and it promotes the development of local identities as well as opening to otherness (both time-otherness, concerning landscapes of the past, and place-otherness, concerning landscapes of far-away places).

Such arguments demonstrate how comprehensive the values concerning landscape education are, that presents its importance not only towards landscape safeguard and landscape quality improvement, but also in itself, as an important step of an educational route.

Many examples of education on landscape do probably exist in geographical curricula and in other educational activities (in school and in permanent education programs), even if sometimes they could not be explicitly named this way. Many projects, experiences and methods concerning the topic at international level are collected in a very first reference list in Castiglioni et al. (2007).

Wide projects promoted by local or national administrations and by other organization (under the impulse given by the European Landscape Convention) have been implemented or are going to be implemented. For examples the administration of the Province of Brescia (Northern Italy) promoted during the school year 2006-07 a travelling exposition on the different aspects of the local landscape, involving schools in visiting it and in participating to a special competition on it (www.ilpaesaggiobresciano.it).

At a national level, the Slovenian Association of Landscape Architects implemented during 2004-2005 the project "We are making our landscape", with the purpose to disseminate knowledge about the landscape to the general public and in particular to stimulate children and adults to observe the landscape in the everyday environment and to perceive the landscape quality, in order to raise awareness. Different steps and activities characterized this project, that involved mostly kindergartens and primary schools: the publication of a series of posters concerning Slovenian landscapes; workshops with teachers; publication of materials concerning the projects, its frame, its values and Slovenian landscapes; competition for arts and photographic works (dividing participants into three age groups); exhibitions and awards of the best works.

Another important project on landscape education is promoted by the Regional Government of Catalonia in coordination with the Landscape Observatory of Catalonia. In order to raise awareness regarding landscape, the Observatory is preparing and disseminating innovative teaching material for pupils in Compulsory Secondary Education. The teaching materials, prepared by people of recognized prestige in these matters, are made up of illustrative prints in a provisional format, allowing the pupils to work in teams on the interpretation of twelve landscapes in Catalonia, and of sets of teaching activities and teaching guides for the academic staff. The materials have already come into use experimentally in six secondary schools, to test their effectiveness. During 2007 these and other teaching materials will be available on the Landscape Observatory web site, so that pupils can use new information technology in the learning processes (www.catpaisatge.net).

3. The project "3KCL – Karstic Cultural Landscapes": a good practice for education on landscape

Supported by the Cultura2000 European program in 2004-2005, the project "3KCL- Karstic Cultural Landscapes" was lead by the Museum of Natural History and Archeology of Montebelluna (a small town in North-East of Italy) and involved research centers and schools in Italy, France and Slovenia. As the title suggests, the project concerns the peculiarities of three karst study areas, that were analyzed by three research teams, "discovered" by local school pupils and then disseminated to the wide public by the pupils themselves (Figure 1). Approximately the project involved around 40 researchers, 50 school teachers and mentors and 600 different aged pupils.

The project represented a big chance and a challenge, too, to develop and implement educational strategies towards landscape in the frame of education on sustainable development; from the final verification of assets, that involved researchers and teachers, it emerges that through the partnership among different groups of participants and the cultural mediation of the Museum, knowledge about the territory raised, the awareness of landscape's values increased as well as of the care for its conservation and safeguard.

The general aims of the project were clearly stated in the proposal document: to provide innovative contents, both from the scientific and the educational profile, in the study and interpretation of the evolution of fragile karst eco-system and of their relationship with human settlements, in order to highlight the value of this cultural heritage, at a European level; to promote a wide cultural dialogue at international level on karst phenomena, that originate unique morphological structures and landscapes; to exchange experiences and good practices; to promote an active role of the schools and of the museum, in order to implement a friendly approach to knowledge for children and young people; to arise children and young people awareness of the delicate equilibrium of karst landscapes.

Both a deeper knowledge of karst landscapes coming from research and the wider awareness of their peculiarities achieved through dissemination activities are fundamental requirements and can represent a very important "first step" in going towards a more sustainable future.
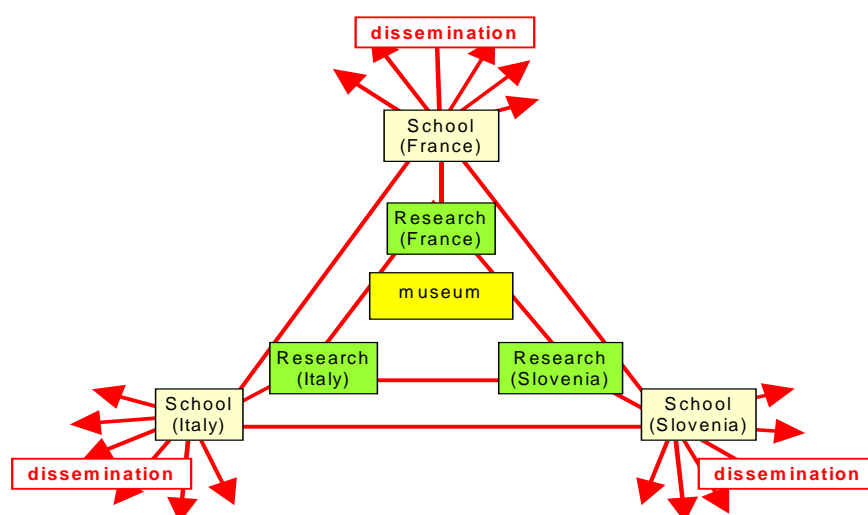
Fig. 1 – The network and partnership of the 3KCL project. The Montebelluna Museum coordinated the whole activities; research partners (Geography Department of the University of Padova – I, Geography Department of the University of Nice-Sophia-Antipolis – F, and Karst Research Institute of Postojina – SI) were in contact among them in order to exchange methodologies and research results, and with their school partners for the direct transmission of research contents (Action 5, see Table 1); school partners had the role of "disseminators", as they built the materials for the exposition and the website pages, and were in contact among them through the website itself.

As shown in figure 1, the partners were part of a sort of network, made of a complex of relationships, each partner with a specific role. To attain the goals, the project proceeded in parallel along two main paths (Table 1): the first concerned research on natural and human aspects of karst landscapes, and on their relationship, too; the second focalized on education and dissemination: the knowledge achieved in research has been directly shared with school children, towards a wider awareness of a large public of karst landscapes as a very peculiar natural and cultural heritage.

The educational phase can also be divided into three different steps.

The first one (Action 0) consisted in a sort of introduction for the school activities, a general view to landscape, required to frame the study in depth on specific landscape features of the

following phases. Specific educational targets were involved, too: learning to look through landscape with attention; recognizing different landscape elements and their relationships that characterize the uniqueness of each landscape; recognizing that landscape sends sensations and excites emotions in oneself and in other people; looking for an explanation of some landscape features, in connection with natural and human factors; understanding landscape change. Specific educational tools were used in order to achieve these aims.

In the second step (Action 5) researchers met the pupils with lessons or field trips and explained to them the research results (obviously with the adequate language).

In the third one (Actions 6, 7 and 8) the pupils themselves prepared the materials (posters, web pages or other materials) to present to a wider public what they learnt.

The structure of these parts of the project is really innovative, both for the direct contact between the research worlds and the school world, and for the very important and active role played by the pupils themselves in dissemination activities. Both of these aspects have been considered by the teachers as very important inside the project.

Table 1 – The project structure.

RESEARCH PHASE	ACTION 1 (A1)	First coordination workshop	November 2004
	ACTION 2 (A2)	Scientific study of 3 karst areas	November 2004 – April 2005
	ACTION 3 (A3)	Second workshop: comparative results about the 3 karst areas	April 2005
	ACTION 4 (A4)	Scientific publication and implementation of the website	March – July 2005
EDUCATIONAL PHASE	ACTION 0 (A0)	Introductive activities of "reading landscapes": teachers workshops, field trips, activities	November 2004 - March 2005
	ACTION 5 (A5)	Contents transmission to the partner-schools	March – April 2005
	ACTION 6 (A6)	Educational materials produced by the partner-schools	March – June 2005
	ACTION 7 (A7)	Implementation of the web site by the partner-schools	April – October 2005
	ACTION 8 (A8)	Final exposition, disseminations of results	June – October 2005

Final products of the educational phase are the 30 posters of a traveling exposition that was opened in Montebelluna in June 2005, in Postojina in September and in Annot (France) in October. Other materials, different in each country, completed the exposition. The posters' content represent also the main content of the pages of the website www.3kcl.net. This tool has great importance for a wide dissemination of results, reaching not only people living near the karst areas, but, potentially, all over the world. Moreover, through the web site the pupils could keep in contact among the three countries, feel the international dimension of the project and, to some extent, "exchange their landscapes". They learnt about the other karst areas, and – mostly – they were stimulated in finding the way (and the language) to present to the pupils of other countries their "own" karst landscape.

4. Conclusion: the project "3KCL" – a good practice in the decade of education for sustainable development

The uniqueness of karst landscapes, that are widespread but known only where large caves exist, represents a very interesting "experimental field" to propose actions devoted to a better knowledge, comparison and popularization, and to improve the acquisition of more responsibilities towards territorial and environmental matters. Moreover, the through-time reading of remote and recent changes leads to re-discover near but often unknown worlds: landscape can play the function of a "knot" among different cultures and among different generations. The activities and the results of 3KCL project seem to match these goals of the European Landscape Convention, they seem to act in the same direction.

Moreover, taking into consideration ESD reference points (www.unesco.org/education/desd), it has to be "interdisciplinary and holistic: learning for sustainable development embedded in the whole curriculum, not as a separate subject". The 3KCL project is built as interdisciplinary, involving different subjects both in the research and in the educational phase; stressing this point, the whole project is built with a strong relevance of the relation dimension, at different levels: the research world and the dissemination and education world; the three karst areas, partially similar and different, compared; the different landscape aspects that are analyzed, starting from the idea that the landscape itself is the display of the relationship between man and environment, and is at the same time natural and cultural heritage; the relation among teachers and pupils of different age, different schools, different countries; the relationship between the schools and their surrounding territory.

Another peculiarity of ESD is "critical thinking and problem solving: leading to confidence in addressing the dilemmas and challenges of sustainable development": through the direct relationship with the researchers, children learn not through a "ready for use" box of knowledge, but through a scientific and critical approach to the complexity of environment and landscape; when they prepared the dissemination materials they had to be critical, too, choosing among the most relevant contents and the best way to communicate them.

Moreover, ESD, that is considered "multi-method", follows "an approach in which teachers and learners work together to acquire knowledge and play a role in shaping the environment of their educational institutions": in 3KCL researchers, teachers and children really work together and cooperate under the coordination of an "open to change" museum.

Finally, the project is "locally relevant: addressing local as well as global issues, and using the language(s) which learners most commonly use". As "education and learning lie at the heart of approaches to sustainable development", we hope that 3KCL project and its activities in landscape education could represent a good example and a "best practice" for such important requirement.

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An Action Research Framework For Enhancing Partnership Between Rural Schools And Communities In Local Sustainable Development: A Case Study In Taiwan

Kuang-Chung Lee (Hualien)

Abstract

Rural schools usually play a crucial role in the education, economic and social development of their communities in countryside areas. Particularly, rural schools have potential to generate social capital where the level of social capital of communities is low. Evidence shows that many small rural communities have failed to remain robust and sustainable after losing their local schools. Numerous studies have examined how more participatory approaches to enhancing partnership between rural schools and communities can be promoted. However, most participatory approaches are not theoretically-driven and lack of empirical evidence to evaluate their effectiveness in a specific social, economic, political, and ecological context. Without a firm theoretical framework and explicit criteria for evaluating the processes and outcomes of these participatory approaches, it is difficult to provide a systematic analysis of these approaches.

The aim of this paper is to put forward an action research framework for developing and evaluating local participatory forums for enhancing partnership between rural schools and communities in local sustainable development. This action research framework comprises two 'task circles'. The first is to review the current status. The second is to implement new community-based participatory forums and evaluate their effectiveness. The process of designing, implementing, and evaluating participatory forums is conducted in the light of Healey's theory of collaborative planning. In addition, Healey's three criteria, i.e. the generation of knowledge resources, relational resources, and mobilization capacity, are employed to evaluate the effectiveness of new forums in terms of 'institutional capacity-building.' The framework proposed in this paper has been applied and proved to be useful in authors' recent research projects in several rural and natural areas of Taiwan.

Keywords: School-Community Relations, Participation, Sustainable Development, Participatory Forum, Collaborative Olanning, Action Research

1. Introduction

Like many countries of the world, more and more rural communities in Taiwan become isolated and in decline on limited economic bases. Markets for rural products are shrinking owing to shifts in national and global economies. As a result, many communities have lost their vitality as people leave to find jobs elsewhere (Keyes and Gregg 2001).

Recent literature of community development indicates that the capacity of rural communities for managing change is affected by the amount of social capital within the community, i.e. by the strength of interactions among community members (Lane & Dorfman 1997; Holladay 1992). Research also shows that the quantity and quality of the interactions influence the

social and economic achievement of those communities (Kilpatrick, Bell & Falk 1999; Falk, Harrison & Kilpatrick 1998; Kilpatrick & Bell 1998).

Rural schools usually play a crucial role on the education, economic and social development of their communities in countryside areas (Glen *et al.* 1992). Particularly, rural schools have potential to generate social capital where the level of social capital of communities is low. Evidence shows that many small rural communities have failed to remain robust and sustainable after losing their local schools (Jolly and Deloney 1996, Bowie 1994).

Numerous studies have examined how more participatory approaches to enhancing partnership between rural schools and communities can be promoted (Otterbourg 1998, Molloy *et al.* 1995, Lane and Dorfman 1997). However, most participatory approaches are not theoretically-driven. Without a firm theoretical framework and explicit criteria for evaluating the processes and outcomes of these participatory approaches, it is difficult to provide a systematic analysis of these approaches. The aim of this paper is to put forward an action research framework for developing and evaluating local participatory forums for enhancing partnership between rural schools and communities in local sustainable development.

2. Methodology

'Communicative planning' (Forester 1989), 'argumentative planning' (Fischer and Forester 1993), 'planning through debate' (Healey 1992), 'inclusionary discourse' (Healey 1996), or 'collaborative planning' (Healey 1997, 1998) are terms widely used in planning theory literature in the 1990s. This theoretical development is closely associated with the work of Patsy Healey (Rydin 1998, Tewdwr-Jones and Thomas 1998, Tewdwr-Jones and Allmendinger 1998). Her work seeks to develop a new approach to spatial and environmental planning to cope with concerns about the quality of places and dilemmas about how to 'make sense together while living differently' (Forester 1989: 118). On the one hand, people celebrate diversity and individual liberation; on the other, they are often confused by the conflicts among different interest groups and threatened by the environmental degradation. Healey argues that these dilemmas require a new approach to planning which offers both a force to change the quality of places and to change normative ideas about the forms and processes of collective governance. Social capital (relational resources), intellectual capital (knowledge resources), and political capital (mobilisation capacity) are terms used by Healey (1998) to describe 'institutional capacity-building' which is a key concept in collaborative planning.

To put forward an action research framework for developing and evaluating participatory forums for school-community involvement in sustainable development of the areas, three questions need to be addressed as follows:
1) Is there any existing participation mechanism well enough for building up partnership among different stakeholders for sustainable development of the areas? (current status review);
2) If not, how to design and implement community-based participatory forums to enhance the collaborative governance among stakeholders? (new forum design and implementation);
3) How to evaluate the effectiveness of the community-based participatory forums? (effectiveness evaluation)

To address the above questions, an action research framework is developed, in the light of Healey's theory of collaborative planning, for designing, implementing and evaluating community forums for planning and management of rural and natural areas (Lee, 2003; Lee and Wang, 2004). The framework has been applied and proved to be useful in three recent research projects on a Wildlife Refuge (Lee, 2001; Lee, 2002, Lee, 2003a, Lee and Wang, 2004), two National Parks (Lee, 2003b, 2004a), and a Forestry Cultural Park (Lee, 2003c,

2004b) in Taiwan. The framework comprises two 'task circles'. The first task circle is to 'review the current status'. The second task circle is to 'design and implement new forums and evaluate their effectiveness' (Figure 1).

2.1 Current status review

The aim of the first task circle is to review the current issues that stakeholders concern about as well as the working partnership among them. It is conducted through 'issue analysis' and 'stakeholder analysis.' The first task circle is to answer the first research question about 'whether or not the existing participation mechanism is well enough for building up partnership among different stakeholders for sustainable management of the area.' In terms of 'action research circle', i.e. planning-action-evaluation/reflection (Kemmis and McTaggart, 1988; Kuhne and Quigley, 1997; Stringer, 1996), the first task circle of the framework is at the stage of 'evaluation/reflection.'

Figure 1. An action research framework for establishing and evaluating community forums

Issues analysis is to identify those issues that different stakeholders think are important and the opinions that different stakeholders have. It is helpful to categorised issues into three

groups in the light of 'three pillars of sustainable development' (OECD and UNDP, 2000): issues of environmental sustainability, issues of economic sustainability, and issues of social sustainability.

Stakeholder analysis is "an approach and procedure for gaining an understanding of a system by means of identifying the key actors or stakeholders in the system, and assessing their respective interests in that system" (Grimble and Chan, 1995). It includes the identification of key stakeholders, and their interests, importance and influence, and the analysis of potential coalition, or relative risks of each stakeholder. Detailed procedure includes:
1) Listing all primary and secondary stakeholders;
2) Listing all stakeholders' interests;
3) Assessing the impact of proposal on their interests;
4) Assessing the importance and influence of stakeholders;
5) Combining influence and importance in a two-dimensional matrix;
6) Identifying appropriate ways of stakeholder participation;
7) Comparing employed ways of stakeholder participation with step 6 to indicate issues of stakeholder participation (ODA, 1995a, 1996b; DFID, 2002).

Cook (1997) divides the role of the researcher into four categories: overt observer, overt participant, covert observer, and covert participant. He suggests that researchers may move between roles as their research progresses and as they contact with different people. At the stage of the first circle, the researcher basically plays an important role as 'observer/analyzer.' Since the objective of this stage is to understand people's interests and their activities in context, researchers should try to be a good listener so that they can learn from people and eventually gain some sense of place.

2.2 New forum implementation and effectiveness evaluation

If the evaluation of the current status of stakeholder participation (as in the first circle) is not good, new participatory forums will need to be implemented. The aim of the second task circle is to design and implement new forums for institutional capacity-building among stakeholders as well as to evaluate the effectiveness of the forums. It is to answer the second and the third research questions about 'how to design and implement community-based participatory forums to enhance the collaborative governance among stakeholders?' and 'how to evaluate the effectiveness of the community-based participatory forums?' In terms of 'action reserch circle,' the second task circle of the framework is at the stage of 'planning/action/evaluation.' At this stage, reseachers can play an important role as a 'facilitator/partner.'

The preparation and implementation of new forums can be conducted in the light of Healey's five groups of questions including 'Who gets involved?' 'When and where to meet?' 'In what style does discussion take place?' 'How can the arguments be sorted out and a new discourse be created?' 'How to maintain the agreements and critiques?' Healey's three criteria, i.e. the generation of knowledge resources, relational resources, and mobilization capacity, can be employed to evaluate the effectiveness of new forums in terms of 'institutional capacity-building'.

3. A Case Study

The case study area is in two nearby rural communities, each has a small elementary school, in the east part of Taiwan. The findings show that the 'school-community partnership platform' is like a new bridge connecting and activating partnership between the Lichi community and the Lichi elementary school, as well as the Fuyuan community and the Fuyuan ele-

mentary school. Besides, through a panel discussion on the platform, this study enables stakeholders of both schools and communities to draw up and put into practice the community projects that, as a result, initiate the new school-community interaction. The 'school-community partnership platform' helps clarify the major interests and requirements of community inhabitants and school teachers. Furthermore, after a lot of discussion, community inhabitants and school teachers figured out a common ground of their interests and goals. They worked together to apply for relevant community development projects, including the Community Forestry Project of Forestry Bureau and the Holiday School Project of Education Bureau of Taitung Country to achieve their aims.

Therefore, 'school-community partnership platform' proves to be a genuine assistance to promote knowledge resources, relational resources, and mobilization capacity between schools and communities. Nevertheless, the outcomes of the two studied areas are remarkably different. The difference might be caused by the following 9 factors: on the aspect of knowledge resources, the possible causes are 'mutual requirement of expert knowledge and local knowledge' and 'fitness of community projects for school teachers' and local people's interests'; on relational resources aspect are 'leadership', 'cohesiveness', 'mutual respect and approval among school teachers and local people'; and on mobilization capacity, 'consolidation plan for merging school districts', 'operational mechanism of the school-community partnership platform', 'available time for participation', and 'equal opportunity of benefit-sharing' are considered to be critical.

4. Conclusion

Based on the case studies conducted by the authors, the action research framework proposed in this paper proves to be generally useful and workable. The community forums conducted in the light of the framework provide as a participatory method to help rural schools and communities to build up their institutional capacity. The forums provide opportunity for stakeholders to discusse a range of issues based on local knowledge previously not addressed in traditional planning meetings. The forums also involve stakeholders who have previously been excluded from the traditional planning processes. The forums are designed to bring together rural communities, local schools and the management authorities in a face-to-face, mutual understanding process. These forums demonstrates how new political instruments designed to build institutional capacity amongst all relevant stakeholders can be used as a means of mobilising collaborative actions.

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Symposium Session:
People, Place, Values and Meaningful Learning

Geographical Education For Sustainable Development By Living Learning With Theme-Centered Interaction (TCI)

Stefan Padberg (Köln/Cologne)

Abstract

How can we practise geographical education for sustainable development that is, itself, sustainable? I invite you to follow my experiences and thoughts, taking some steps in this direction with a didactical model based on clearly formulated values that express the desire for a sustainable world while offering a methodical tool that helps effectively communicate values and establish attitudes of sustainability in our classrooms.

Keywords: Living Learning, Participation, Values, Dynamic Balance between Person, Group, Context and Globe

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Teaching For Understanding: Designing Curriculum For Instruction Using The Understanding By Design Framework For Geography Teachers' Pre-Service Education

Ivy Geok Chin Tan (Singapore), Lay Cheng Lian (Singapore)

Abstract

Many geography teachers in Singapore plan their lessons according to the text in geography textbooks. They are concerned with the coverage of the syllabus and classroom activities are planned based on the existing worksheets in the students' workbooks. The focus is on what the students need to know so as to do well in the tests and examinations. As a result, geography is seen by many students as a boring subject that requires much memorizing of facts for the sole purpose of assessment.

The authors are exploring with the use of Understanding by Design (UbD) (Wiggins & McTighe, 2006) framework in the pre-service module on geography education to equip student teachers with a more effective means of unit and lesson design aimed at teaching for understanding. UbD is a way of thinking more carefully about the what, why and how of teaching. It provides a framework to enable teachers to design curriculum units by first clarifying the learning goals; second, devising performance assessments as measures of student understanding; and finally designing the instructional activities for effective and engaging learning. The primary value of UbD is to get teachers to design instruction that gets to the core of a discipline that we teach. The focus is on teaching for understanding as oppose to knowing so that learning is meaningful and transferable. The paper examines the why and how the pre-service module is designed using the UbD framework and identify issues pertaining to the implementation and adoption of the framework.

1. Introduction

The educational landscape in Singapore has been undergoing significant changes since 1990 in the light of global changes in the economic, technological and social climate. In 1996, an external review team was commissioned to examine the prevailing school curriculum and to make recommendations for educational reforms. The review team highlighted the need to deal with the overcrowded curriculum that did not generate a positive learning culture. There was a heavy emphasis on drilling students to get the right answers and little time was left for creative teaching and learning. One of the review team's recommendations was to cut down on the curriculum content so as to free up time for all students to experience self-directed learning through open-ended assignments (Ministry of Education, 1998).

Based on the recommendations of the review, a number of educational initiatives have been progressively launched in schools. The most recent initiative is "Teach Less, Learn More" which called for teachers to teach less (factual content) and to engage students to learn more deeply. This new initiative demands new roles for teachers which are radically different from their traditional roles of providing students with a large quantity of content from the text-

books. There is a need for teachers to stop thinking in terms of inputs, "What I am teaching" and start thinking in terms of outputs "What my students are learning" (Hall, Smith & Nowinski, 2005). Teachers are encouraged to use alternative assessments that are linked to the desired learning outcomes as evidence of student learning.

From our observations and interactions with teachers, we found that the majority of the teachers remain focused on textbooks as a means of instruction in the class. They religiously taught lessons following the chapters in the textbooks as a guide. This focus is on the use of the school textbooks and workbook activities as inputs in their lesson teaching rather than asking pertinent questions such as, `why are they teaching what they are teaching?', `what are the enduring understandings the students should learn at the end of the day?' In short, the teachers are primarily engaged in what Wiggins and McTighe (2006) called the twin sins of instructional design: activity-focused teaching and in coverage-focused teaching.

As teacher educators, we started exploring the use of Understanding by Design (UbD) (Wiggins & McTighe, 2006) as a framework when we revised the pre-service module on Geography education. The revised module was conceptualized with the main aim of equipping our trainee teachers with the 'what', 'why' and 'how" of curriculum planning and instruction in Geography.

The new module focuses on good design of curriculum, performance assessment and instruction that centers on developing and deepening student understanding of big concepts in geography. The key question for us is how can we increase our trainee teachers So What? factor in teaching for understanding of Geography (Chadwick, 2004). The module creates a learning environment for our trainee teachers to practise the principles embodied in teaching for understanding.

This paper will outline briefly what UbD is and the revised pre-service module which was implemented in the first semester of the current year. Feedback on the module was collected from the class of 15 trainee teachers through an on-line discussion and from a final pit-stop discussion at the end of the module. From the feedback, we gathered significant inputs from our trainee teachers regarding their understanding and concerns of the curriculum planning and instruction.

2. What is Understanding by Design?

Understanding by Design (UbD) is a conceptual framework for thinking about the design of curriculum, assessment and instruction. The framework is useful to help teachers design effective learner outcome, assess student understanding and teach for understanding. In the UbD process, teachers think about assessment before deciding what and how to teach rather than creating assessments only at the end of the unit of study. Hence it is also known as the backward design. The teacher's focus is on the desired results of instruction. The teacher should be clear about the purpose of the student learning, the knowledge and skills that student should acquire at the end of the lesson. There are 3 stages of UbD:

Stage 1: Identify desired results
Stage 2: Determine acceptable evidence
Stage 3: Plan learning experiences and instruction

Stage 1: Identify desired result:
Stage 1 is an important part of the UbD process. The biggest problem encountered by any teacher is the huge content that has to be covered within a limited time. At this stage, the teachers need to be clear about the curricular priorities. Teachers have to consider the unit goals, examine established content standards and review curriculum expectations. Most of the

content would fall into the "worth being familiar" category while some would be "important to know and do". The top priority is for teachers to consider what content is worth understanding, what enduring understanding must the students take away. Essentially at this stage, teachers identify the, Big Ideas, Enduring Understandings (EU), Essential Questions (EQ), important knowledge and skills that will result from the unit.

Stage 2: Determine acceptable evidence
At stage 2, the teachers have to think about collecting evidence of student understanding of the unit. What constitute acceptable evidence that will indicate that students have achieved the desired understanding and learning? The teachers would have to plan open-ended authentic performance tasks and projects as well as the traditional tests and quizzes. Whilst traditional tests and quizzes are useful for testing what is important for students to know and do, it is the performance task that can lead to enduring understandings (Wiggins & McTighe, 2006). Such performance tasks are usually open-ended, complex and authentic.

Stage 3: Plan learning experiences and instruction
Finally, at stage 3, the teachers plan the learning activities and instruction. The backward design demands that teachers identify clearly the desired results of instruction and the appropriate evidence of understanding and finally thinking through the most appropriate instructional activities to achieve those desired results.

3. The Pre-service Module

QCG520: 'Classroom and Field Approaches to the Teaching and Assessment of Geography' is a 72-hour per-service module which aims to provide initial teacher training for the teaching for Geography in secondary schools. In the past, the curriculum content for this module was on teaching trainee teachers specific instructional strategies such as role play, simulation games, use of poems, music, cartoons and newspapers. At the end of the module, trainee teachers were required to submit three different types of assessment; a lesson plan, fieldwork package and a web-quest lesson. These assessments were summative and the focus was on the products submitted. The pedagogical approach was activity-oriented. This approach can be fun and interesting as trainee teachers picked up strategies that they could use when they teach in schools.

However, feedback from past trainee teachers revealed that although the strategies taught were fun they were not able to transfer their learning once they are in schools due to the lack of understanding of the fundamentals of the strategies. Many reverted to the tried and tested method of drill and test as they succumb to the demands of schools to cover syllabuses and to ensure good grades for their students.

We began to re-conceptualize the module to address the above concerns and to response to the changing educational landscape in Singapore. We want our trainee teachers to be teachers who can help their students find "authenticity, meaning and utility in what they learn" (Erickson, 2007, foreword by Carol Ann Tomlinson). Hence the focus of the revised module is on:
- the teacher as curriculum designer
- the teacher knowing who the learners are and how they learn
- the teacher acquiring a strong conceptual understanding of the discipline

The UbD framework was adopted because we found that it can help to address our new learning outcomes for pre-service training of Geography trainee teachers. Most importantly, we hope that it will help our trainee teachers develop sustainable behaviors that will enable them to transfer the theories learnt into practice.

The module is organized according to the 3 stages of the backward design. First, trainee teachers clarify the desired learning goals by identifying the essential questions and enduring understanding of the curriculum units. The big ideas and concepts in geography help them make connections within and across the units and even across disciplines. Looking through the conceptual lens, trainee teachers are able to discern patterns and make connections of factual information. Second, they are guided to craft performance tasks and rubrics. These are used to gather evidence of student understanding. Finally several sessions are devoted to designing the learning experiences to achieve the desired outcomes.

As an entry requirement, trainee teachers will develop a unit plan at the beginning of the module without prior training. This draft unit plan will be further revised, reworked and improved on by the trainee teachers as they acquire understanding and skills involved in unit planning in the module. The final unit plan will then be assessed. The big idea of the module is to enable the trainee teachers see their own personal growth in designing unit lessons. Other evidence of trainee teachers learning was demonstrated through teaching in `real classrooms', fieldwork design, classroom and online discussions.

4. Method

4.1 Participants

The participants consisted of 15 graduate students who enrolled in the post-graduate diploma in education programme in the National Institute of Education. Thirteen of them are female and two are male. Their age range is from 23 to 32. Fourteen of these Geography trainee teachers have taught in schools as contract teachers before admission to the programme. Their major curriculum subject for teaching is Geography.

4.2. Data collection

Data for the present paper was collected at two points of time within the module. At the end of stage 2 of the module, our trainee teachers were asked to log onto an on-line discussion. Two key strands were created for the on-line discussion:
Strand 1: What is your understanding of UbD? What are the features of UbD that make it different from the traditional unit planning? How has your new understanding of UbD change your views about teaching and learning in Geography?
Strand 2: What are your concerns about applying UbD in the teaching and learning of Geography?

At the end of module there was a final pit-stop discussion. Our trainee teachers were divided into two focused discussion groups. The duration of the discussion was about 45 minutes and three main areas were identified for the discussion: Enduring Understandings/Essential Questions, Performance Task Assessment and Differentiated Instruction. The intention of this discussion was to engage trainee teachers in a professional dialogue. We hope that as they share their views, raise questions, and debate over issues, it will deepen their understanding of curriculum planning and instruction of geography. Indirectly, we as tutors could 'assess' the trainee teachers' level of understanding, as well as gather feedback on the module.

5. Trainee Teachers' Feedback and Discussion

From our trainee teachers' on-line entries and their reflection at the pit-stop discussion, the UbD framework has guided them to think more deeply about teaching for understanding and not teaching for knowledge acquisition. What is worthy is to teach concepts and look for the

"moral of the story" through the enduring understandings and essential questions. Our trainee teachers also realized that the backward design allows them to be clear about where they are heading and how to go about achieving the desired outcomes. And since the focus is not on testing, there is scope for developing thinking skills and making connections within and across disciplines and to the real world. One trainee teacher commented:

> "I see the key difference with UbD from traditional unit planning in that it begins with the big picture, and the end in mind, bringing to focus all the elements that student/teachers need to 'get there'. There is focus in the unit, centering on key concepts versus on mere facts which seemingly have no relation with each other." (TT-13)

The UbD framework represents a "paradigm shift in thinking about teaching and learning" to some of them. Textbooks provide facts, but it is often up to the teachers to make the facts within the text come alive and relevant to the real world they are living in and make them understand better. Using UbD enables students to make sense of facts, skills and ideas and see connections in what they are learning.

Many of our trainee teachers reflected on the differences of the lesson planning they had been exposed to whilst on contract teaching and the curriculum unit planning they were engaged in the course of the module. They confessed that during their contract teaching period, they would always try to cramp a lot of factual content without reflecting whether the information that that they are feeding the students is relevant or valid or even worth teaching. One trainee teacher reflected that:

> "…when I was doing my contract teaching, all I was concerned about at the time was to finish up the syllabus as I wanted my students to be ready by the time they sit for their examinations. My rationale was that I should attempt to finish the Geography syllabus as fast as I can so that there would be time left for revision and for any clarifications on the students' part. Hence, because of that, there was a lot of frontal teaching whereby I just talked non-stop for the entire 1 or 2 periods with the help of my powerpoint slides. I have to admit, the main priority then was for me to finish up the syllabus in time as that was the instruction given to me." (TT-8)

They realized that UbD re-frames the way they view the curriculum content. UbD forces them to think about the purpose of teaching the geographical content and designing learning experiences for enduring understanding that will promote meaningful learning.

> "Reflecting back, I realized how that I did not design lessons that promote students' understanding and I did not carry out lessons that engaged the students. UbD is different thus, from traditional unit teaching, since UbD makes us focused on designing lessons and activities that promote understanding and student engagement." (TT-8)

Our trainee teachers saw the potential for the integration of subjects using the UbD framework. One trainee teacher commented that she was taught geography by topics, each as separate entity and thus geography was pure memorizing of facts in topical isolation. She found concept mapping of the curriculum unit helped her to see the linkages within and across units making learning meaningful and transferable. They realized that more collaboration is needed between subject teachers to design curriculum. Other subjects can be integrated as well. Another trainee teacher had this to say:

"Personally, I was taught geography in a highly factual, rote-memory system, resulting in snapshots of highly de-contextualised information about certain (for example) river processes, completely divorced from the river system – and the importance of studying the river system itself… I often questioned with a 'so what' mentality. There appeared no conclusion to the matter, no summation about why this unit has an impact in my life, and perhaps most importantly – there was a lack of transfer-ability between Geography and everything else that I was studying." (TT-13)

We found that the trainee teachers were concerned about the quality and accuracy of the Enduring Understandings (EUs) and Essential Questions (EQs). Some comments made were like "I'm still not used to having no "model answer" and "I find it difficult to come up with the correct EU for each topic." Although they have a fairly good understanding of the rationale for using EUs and EQs, they were less confident in their own abilities to construct them especially when they are out alone in schools. Two reasons were given by them to account for their concern. One was that EU is daunting as they are complex and the other was that they needed more time for practice during the module.

The trainee teachers found that they had to re-think the way they perceive assessment. The idea of assessment as evidence of understanding was a new perspective for them. In the past, learning geography is all about doing workbooks and having little class quizzes, tests and examinations. Now, they saw how designing meaningful performance tasks can engage students and help to transfer their learning of geographical concepts as commented below:

"Unlike traditional unit planning which follows closely to the syllabus, UbD requires teachers to design more application tasks where students need to draw upon both their textbook knowledge as well as information from external sources, ie internet." (TT-5)

Another understanding of assessment is reflected in this comment by a trainee teacher: "In addition, while the mode of assessment for traditional unit planning is often summative, assessment in UbD is continuous and the product for assessment can be varied according to the profile of the learners." They saw the importance of on-going assessment to inform both the teacher and students for learning to take place effectively.

From the pit-stop focused group discussion, we could see that our trainee teachers understanding of the nature of performance task was not strong. They tend to lose the focus of the underlying principles of performance tasks. Several misconceptions surfaced from the discussion. They misconstrued that performance tasks must always be a big scale project that covers the whole unit/topic. They also had this misconception that they must cover all the knowledge and skills of the unit before the performance task is assigned. Some viewed performance task as a form of summative assessment.

Most of our trainee teachers stated that they would not be able to use the UbD curriculum unit design if there is no support from the school administration. Within the school system where students would ultimately have to sit for the school-based or national wide examinations, school leaders might not take the risk to try out new ideas at the expanse of grades. There would be the tendency for teachers to adopt the drilling method to teach rather than to teach for enduring understanding. This problem is compounded further with the minimal number of curriculum periods given to Geography. As beginning teachers, they would have to struggle to cope with the demands of the school and classroom management. UbD is still basically quite new in the Singapore classroom context. It would be a challenge trying to change mindsets of the school leaders, students, fellow teachers and even parents in the context where

successful teaching is associated with good academic results which can be derive from the drilling method of teaching.

Our trainee teachers realized that curriculum instruction requires thoughtful planning and thus time is critical for teachers to explore the big ideas, design the learning experiences and source for appropriate resources. Given the demand of teachers in schools, they are concerned about the time constraint. Curriculum time must be extended from the current 35-minute period to allow for engaged learning.

6. Conclusion

Our primary objective that motivated us to revise the pre-service module is to be able to teach our trainee teachers to be "fishers of students" who are able get their students hooked onto meaningful learning and understanding. We hope to put the trainee teachers through a process which will lead to a fundamental shift in their beliefs about curriculum and instruction. The feedback and reflection we have gathered from our trainee teachers enabled us to identify three domains for further examination. These are: understanding the curriculum, knowing the learners and knowing the school context.

The curriculum is the educational experiences jointly created by the both the teachers and students. It is therefore essential for teachers to be active curriculum designers who will be enacting curriculum experiences which are sensitive to the needs of students and responsive to educational initiatives (Gopinathan & Deng, 2006). The revised pre-service module enabled our trainee teachers to gain a deeper understanding of big ideas and concepts in geography at the stage where much time is devoted to curriculum mapping and exploration of big ideas, essential questions and enduring understandings. However, we also realized that our trainee teachers were still overly concern about getting the 'correct' big ideas, essential questions and enduring understandings. They were uneasy with exploration and a few of them still lack the confidence in believing in themselves. The module should provide more time for our trainee teachers to explore and reflect on their learning and build on each other's learning and understanding of the curriculum. There is a need to cut down in the 'content' of our module to allow for more process learning and inquiry.

Knowledge of our learners is vital to curriculum and instructional planning. For effective teaching, teachers must be able to discover who are their learners, how they learn and customize their teaching according to the learning needs of their learners. Hence, we would need to 'walk the talk' by getting to know our learners, in this case our trainee teachers.

Finally, we cannot ignore the real concern voiced by our trainee teachers that the school structure and organization will hinder their application of what they learnt in this module. At the national level, there is a call for change but at the ground level, the response to change needs time. Given this constraint, we hope to develop our trainee teachers to be change agents and also to be practitioners of their beliefs so that they can make changes within their areas of responsibilities.

With all these inputs, we will revise and refine the module further. The focus will be on the learners. A more inquiry approach will be adopted for the trainee teachers to explore the following 4 key questions:
   1. What do we teach? – the big ideas/concepts of the geography curriculum
   2. Who do we teach? – knowing the learners, how they learn
   3. How do we teach? – instructional approaches and strategies for meaningful learning
   4. How do we know that they have learnt? – evidence of learning

We will continue to review and revise the pre-service training module with on-going feedback from both current and past trainee teachers. Besides enhancing their understanding of curriculum planning and instruction for meaningful learning in Geography, we hope to develop teachers with firm beliefs in Geography education and to empower them to handle changes as we live in a complex world where change is constant.

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Sustainable Urban Development Concepts In Political Programs For The Town Hall Presidency In Lisbon

Manuela Malheiro Ferreira (Lisboa)

Abstract

Firstly, this paper presents the origins of the concepts of sustainable urban development and urban sustainability. Secondly, are presented indicators of sustainability that take into account economic, social, environmental and cultural aspects.
Due the different components that involve the concepts of sustainability and development, the concept of "sustainable urban development" is not universal but it varies in accordance with the communities, with their political, economic, social and environmental realities and with their values and attitudes linked to their cultural characteristics. Consequently, sustainability and development problems can be only be solved by means of an active participation of informed citizens that seek: to know the realities at different scales; to understand the relations between society, economy and environment and, the relations between the way of living of their urban community and of other communities. Citizens that are aware of the need to take into account the necessities and rights of the present and future generations and, that understand the relations between power, resources and human rights. Citizens that are also able to evaluate the consequences at different levels of the different styles of life of the populations and the answers that the individuals and the organizations can give to the different problems of local scope.
In order to understand the concepts of urban sustainability and development hold by active and participative citizens, the 2007 political programs for the Town Hall Presidency in Lisbon where analysed. Results pointed out for the fact that citizens hold different concepts of sustainable urban development and of the ways to improve the quality of life in the urban setting.

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Symposium session: Technology and ESD

Geographical Information Systems In Education For Sustainable Development: A French Case In Environmental Issues

Ilta-Kanerva Kankaanrinta (Helsinki), Danielle Lavollée (La Ville du Bois)

Abstract

The paper discusses the linkage between environmental issues as one of the elements in Education for Sustainable Development, ESD, and Geographical Information Systems, GIS. The empirical part of this paper includes a French case. The United Nation's decade of ESD, 2005–2014 has environment as one of the key action themes. GIS can handle environmental issues of living and non-living spheres of the Earth effectively, but not so obviously for distributed human cognition, the Noosphere. The European project GISAS (2003–2006) aimed to introduce GIS into secondary school geography. The students handled the water quality of their local river and used ArcView software for GIS. The general research question (RQ) was: Based on self-evaluation, what do students go through when studying environmental issues using GIS? More specifically, RQ1: What do students learn? RQ2: What kind of positive experiences and, RQ3: what kind of problems do students have? In 2006, 21 French students aged 15–18 answered a questionnaire with open-ended questions. The method was a qualitative content analysis. In the results it was noticed that (RQ1) most students had learned to use GIS software with the help of someone else. More than half felt they had become a kind of GIS expert. However, they had not assimilated the central idea of GIS: experiencing the world as layers. Positive experiences (RQ2) were frequent: students liked fieldwork, cooperation and communication, but only one student mentioned software itself or working with maps. Problems (RQ3) were frequent, too, especially the use of GIS. – The conclusion from this was that the use of GIS for ESD in environmental issues makes learning more versatile and complex, adding both positive experiences and problems. GIS software is difficult for students, but the complexity makes students communicate with others and this communication adds to the pleasure and efficiency of studying.

Keywords: Education for Sustainable Development, Geography Education, Geographical Information Systems, Communication

1. Introduction

1.1. Education for Sustainable Development vs. Geographical Education

Our Common Future (1987), the Report of the World Commission on Environment and Development is often named as a starting point for global sustainable development. According to the report (p. 54), sustainable development is "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". The

report emphasizes the needs of developing countries and combines economic and social factors with environmental factors. Further, it extends the concept of needs from basic ones like food or clothing to aspirations for a better life. When analysing the concept of sustainable development, the report mentions the air, water, soils, minerals, forests, natural systems, energy, renewable and unrenewable resources, wastes, the ecological crisis, the carrying capacity of nature and, finally, the population.

It is clear that sustainable development handles the same issues as geography: living and nonliving systems on Earth and Man's role in their functioning. That means geography educators and researchers must take responsibility for education for sustainable development.

Because of the United Nations Decade of Sustainable Development (2005–2014) the theme is highly topical in 2007. This can be measured with digital indicators like Google and wikis. In 2007, Google identified 15 million hits for sustainable development and 750 000 hits for ESD. Simultaneously, the general Wikipedia (2001–2007) had numerous articles on sustainable development and a beginning portal.

1.2. The gap between classroom GIS and students' cyberspaces

Geographical Information Systems or GIS have been used for environmental issues in organisations and in administration from the 1980's (Longley & al. 2001, p. 11). However, its educational use in schools is just emerging (Bednarz & van der Schee 2006). Using GIS in environmental issues includes many promises, e.g. GIS can handle environmental issues to improve students' abilities in higher thinking skills like synthesis and evaluation (West, 2003).

Students and teachers use various applications of information and communication technologies, ICTs. The OECD study (Are Students Ready for a Technology-Rich World? 2006) states that a clear majority (79 %) of students in secondary education had a computer in school and at home in 2003, and the proportion of frequent home-users was high. The students were confident in using the Internet as an information resource. In Schleicher's studies (2002) the students used the Internet also as a source of geographical information. In the OECD 2006 study, students were also confident in using the Internet for communication. In 2007 (DiPerna 2007) they frequently used applications for social networking; they were beboing, facebooking, IMining and spacing with Bebo, Facebook, Instant Messenger and My Space. They live in cyberspaces that are characterized by frequent and intensive ways of communication.

The students have better and better preconditions for understanding the various applications of ICTs, including GIS. However, problems with GIS applications still exist, and software is often difficult for them (Schleicher and Lawrence 2005). We noticed the same features in unpublished material from 2006 representing 14 European countries. Students aged 14–18 (N = 131) who had the opportunity to try professional GIS software rated its usability or entertaining features as difficult (one fifth of students) and boring (one third). However, in fact, students use GIS applications without employing this concept. Many simulation strategy games are based on GIS. In the same unpublished material, ten percent of boys played GIS based simulation games.

So even if students use lots of certain ICT applications, they do not acquire the skills that are needed in order to apply GIS to educational purposes. There is a gap between the students' ways of using ICTs for private purposes and the school's ways of applying them.

1.3. Layers of GIS *vs.* spheres of the Earth and communication

Layers are key elements in GIS. Digital maps consist of layers and we can choose certain variables among them; we can count, organize, reorganize, analyze, synthesize, describe and represent phenomena in various ways, over and over again. This way of thinking can be extended to other fields of human life: phenomena and processes are constructed of elements, and we can pick selected sets of them for our discussions and thoughts. For example, when looking at a scene we can pay attention to rocks, or to auditive effects or to artifacts. That is why we understand GIS as much more than a method or even a methodology. GIS are a way to understand the world, a philosophy that helps in analyzing the physical world and its mental representations.

In geography, the Earth has been described as a combination of layers or spheres since the 1870's (Samson & Pitt, 1999, p. 12). Among the various spheres there are, for example the solid Lithosphere, the watery Hydrosphere and the gaseous Atmosphere, forming together the Geosphere. In addition to this nonliving system, there is the Biosphere and the human Anthroposphere as a part of it. In 1925, a French Jesuit priest and palaeontologist, Pierre Teilhard de Chardin (1959/2002), described the Noosphere as a sphere of thought, the soul of the Earth. The correspondence of the Noosphere and the Internet is clear and has been observed in many papers (e.g. Samson & Pitt, 1999, p. 144). Being the collection of scattered human knowledge, the Internet is the manifestation of the Noosphere.

We have the layers of GIS and the spheres of the Earth, including the Noosphere. With GIS we can describe the layers of the Geosphere and the Biosphere. What is not so obvious for GIS is the Noosphere. The representations of Noosphere are human thoughts, speech, written, visual and documents containing numerical data. We can describe human knowledge, attitudes and opinions through GIS. This results in one-way communication documents, maps without any dialogue. In order to really reach the Noosphere, we need direct and mediated communication. Direct communication, face to face, will always have its primary benefits like co-presence, synchrony of dialogue and nonverbal expressions. The meaning for direct communication in the class when teaching with GIS has been emphasized e.g. by Christie (2007). She used GIS in lots of discussions resulting in student-centered, personal, authentic, and collaborative learning, all characteristic of constructivistic learning. In order to reach people and groups in distant places we need effective communication technologies. We can use e-mail, Messenger, mobile multimedia communication, videoconferencing and, Skype, boostered with web cameras. Here we have the link to our students who already are familiar with such applications.

2. Education for sustainable development in France

In France the concept of sustainable development was adopted from Our Common Future (1987). Education for Sustainable Development (ESD) was generalized in a systemic and holistic approach in a three years plan for 2004–2007 (Généralisation…, 2004). Its main objective was to educate future eco-responsible citizens to protect and respect the environment, human needs, economy and the solidarity of societies on the Earth. ESD should be transdisciplinary, include many partners and be realized through projects. The results were many successful ESD projects with local or European authorities and associations.

A second three years plan for 2007–2010 (Seconde phase de généralisation, 2007) includes a new broader expansion of Education for Sustainable Development (ESD). ESD is based on the United Nation's Decade of Education for Sustainable Development 2005–2014, on the Vilnius framework (2005), and on the French charter for environment (Le texte de la Charte, 2005). Three priorities are mentioned: to include sustainable development everywhere in the curricula, to encourage the development of eco-responsible schools and to train teachers to use a scientific and prospective approach when dealing with sustainable development (Morin, 1999). In order to promote ESD, various pedagogical resources and exhibitions are offered on national portals of the Ministry of education.

In 2007 Education for Sustainable Development was introduced in themes and schoolbooks for civic education, history, geography, biology, mathematics and physics. Because of the complexity of ESD, students in primary education work at a concrete level in local outdoor activities. Students in secondary education work with more complex and abstract situations, handle problems involving discovery learning and adopt a holistic approach, using booklets, exhibitions and, debates.

3. The empirical problem statement and method

One of the authors was the teacher of the French class which used GIS applications in environmental issues in 2004–2006. They participated in the GISAS project, the aim of which was to integrate GIS with secondary education in eight European countries. The students collected water samples in the field, measured its chemical quality and identified aquatic macroinvertebrates as indicators of water quality. The students described them on maps with ArcView 8.3 software.

We collected data from the French students participating into the project. The general aim of the study was to clarify the studying process when using GIS for environmental issues in secondary education. Our general research question (RQ) was: Based on self-evaluation, what do students go through when studying environmental issues using GIS? In detail, RQ1: What do students learn? RQ2: What kind of positive experiences and, RQ3: what kind of problems do students have?

We gave the students (N = 21) in 2006 an electronic questionnaire. The questionnaire included open questions concerning students' activities (2 questions), learning (6 questions), understanding of GIS (4 questions), positive experiences (3 questions) while using GIS and, problems (2 questions). The students answered these questions by writing their answers into a text file in the presence of their research-teacher in order to offer the opportunity for discussions and reflections. When analysing the questionnaire, we followed the general content analysis model where the material is reduced, displayed and conclusions are drawn (e. g. LeCompte & Preissle 1993). We copied students' electronic answers into an Excel file, read the answers and searched for characteristic keywords and concepts. Then we created categories of answers for each question and counted frequencies of various categories and reached conclusions.

4. Results

We recieved to questionnaires from 21 students aged 15–18, 10 males and 11 females. They had used GIS during the last school year in 27 lessons on average (range 15–40 hours). Their general ICT skills were, according to self-evaluation, good but not excellent.

Most of the students had learned (RQ1) to use GIS with the help of someone else, not independently. More than half of the students felt they had become a kind of GIS expert. The students had also learned cooperation with other students and various adults like the people from administration, some also worked as a co-teacher in the classroom.
"I'm don't feel like an expert, but I can explain the project or the utilisation of ArcView, and I can answer to the questions they can ask me, and I know more things in GIS than they do, so for them I think I'm a kind of expert." (Buzz, 15)

The basic principle in GIS is to comprehend space in layers, and we asked whether the students had adopted this idea. The answers were negative, e.g.:

"No, because it's really difficult to represent to myself the world around like a map with different layers. But it's really helpful to analyse the different events of our world like with the tsunami in Thailand. And we can think of what's happened and why and what could happen." (Alexander, 15)

The students had lots of positive experiences with environmental GIS (RQ2): they liked fieldwork, cooperation and communication, but only one student mentioned the software itself or working with maps.
"When I do an interview with an expert in water (Lyonnaise Des Eaux) to collect information and to write a letter for our project, Youth Eco-parliament." (Sarah, 16)

Problems in the project (RQ3) were frequent, too, especially in the use of GIS but also with the English language.
"At the beginning, it was really confused because I didn't really understand the aims of the project but then it was ok." (Pimousse, 15)

Students' summaries of working with environmental GIS in the project varied from positive to nonchalant:
"I think it is a good project and I want to say, "continue it again". During this project I was very interested in the problem of environments of my region and in Europe." (Mwadouni, 15)
"I want more information because the project is difficult." (Nico, 16)

5. Discussion and conclusion

Students in the project had learned GIS on a basic level and felt self-reliance in relation to it. That means they had developed the beginning of abilities to handle nonliving and living spheres of the Earth with GIS. The students loved to communicate with others which is necessary in order to reach the distributed human cognition, the Noosphere, and to discuss environmental problems.

Environmental issues as a part of education for sustainable development are complicated. In order to understand them all, the best tools are necessary. In this respect GIS offer powerful tools for handling the environmental issues of the Earth. In addition to GIS, lots of direct and mediated communication on local and global levels are necessary in order to really understand them. As a conclusion: when using GIS in education for sustainabele development, social and communicative aspects should be emphasized.

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Possibilities To Utilize GIS In ESD – From A Research On GIS For Secondary School Teachers In Japan

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Abstract

The characteristic of ESD as a new paradigm is that future prospects and viewpoints of global citizenship are required. GIS is a powerful set of tools to reveal phenomenon in a certain area and to help decision-making. Considering the features and functions of GIS, it is certain that this map tool is effective in ESD. To examine the possibilities of using GIS in ESD, the authors made an inquiry on usage of GIS in upper secondary schools. The focus was mainly on geography teachers in upper secondary school. Only a few of the respondents have used this tool in class. Some teachers pointed out the computer environment in school as a reason not to use GIS. On the other hand, some teachers recognized they cannot use GIS because of lack of their knowledge and skill. Many of them answered they neither know nor use GIS much, however three quarters of respondents answered that GIS is useful to high school geography education. Their answers revealed that the implementation of GIS in class is the status quo of teachers in Japan. Because of the curriculum, entrance exams or their daily work, teachers are too busy and have little time to absorb any new skills. These results indicated the obstacles of introducing GIS in schools. To install GIS in class and conduct classes of ESD, it is necessary in society to develop teachers who can understand them and utilize the tool.

1. Introduction

Education for Sustainable Development (ESD) is a vision of education that seeks to empower people to assume responsibility for creating a sustainable future. In the field of education, it is an important issue to developed citizenship for all people. This is especially true in schools, where developing citizenship for pupils allows them to realize that we shape our future by our own hands.

In ESD, the environment, peace, human rights and welfare issues are of primary concern, and multidisciplinary expertise is needed for these studies. From this point of view, a geographical approach suits lessons in ESD, because geography can be employed in interdisciplinary study. In addition, using Geographic Information Systems (GIS), data explaining these issues can be integrated into a map, making it possible to be visualized. Therefore, pupils will be able to identify these issues and recognize that these problems are linked to our society. GIS offer the key for applying a geographical approach to ESD.

GIS's nature, such as making interactive maps, functions to produce users' own maps quickly and easily, to process geographical information, and provide aid, especially to inquiry learning (Freeman 2003). Therefore, teachers have been interested in this tool and many experiments have made in over the last decade all over the world. In Japan, GIS has been said to be very effective for education. The government, professors and GIS vendors have utilized this tool in many projects to promote education with GIS; however, it's a situation in which only a few motivated teachers are using it.

In this article I will introduce the results of our research to secondary school geography teachers on GIS and show the status quo of the utilization of this tool and discuss the future possibilities of integrating GIS and ESD into the curriculum.

2. Research on the Use of GIS for Upper Secondary School Teachers

2.1 Basic Data of the Survey

The authors made an inquiry survey of teachers who teach geography in upper secondary schools in the Hokuriku district. This region was selected because this is thought of as a typical local area, with about 3 million inhabitants. The survey was conducted from December in 2006 to January 2007 and the questionnaire was distributed to all 156 upper secondary schools in the district. The contents of the survey included the teacher's major, subjects and grades to teach, use of GIS and opinions on GIS.

The percentage of replies was 34.6 percent (54 persons,) 85.2 percent of respondents were male (46) and 14.8 percent were female (8). Their average age was 42.9 years old.

2.2. Features of Geography Teachers and Use of GIS

Half of teachers surveyed (48.1 percent, 26) teach only geography classes, while 44.4 percent of teachers (24) teach geography and other subjects. In other words, 92.6 percent of respondents conduct geography classes. All of the teachers who teach more than 2 subjects including geography also teach history classes. This is because a teaching certificate for a geography teacher is issued as a teacher's qualification in geography and history and teachers who have this license can teach both subjects in Japan. Other teachers teach informational study, civil engineering and so on. Teachers have classes in more than 2 different grades on average, mainly 2nd and 3rd grade in upper secondary school.

About a half of respondents' original major was geography (53,7 percent□29.) Subjects of social science like history, economics or sociology and pedagogy were the majors of those remaining. This result shows that there are quite a few upper secondary school teachers who teach geography without studying professional geography in college.

Among these teachers, 42.6 percent (23) of teachers answered they are already familiar with GIS. They learnt GIS by themselves or in-service training course on GIS. Few teachers have studied GIS in university.

Of the teachers surveyed, 25.9 percent (14) have used GIS. Most of the GIS software that has been used or is currently being used is freeware, which is available on the Internet. Some of OTS software is inexpensive (about 10,000 JPY =80USD.) Teachers have started to use these programs within the past 5 years.

One quarter of those surveyed understand GIS and have used this tool. However, teachers who use GIS personally are 16.7 percent (9), and, surprisingly, only a few teachers have used GIS in class (5.6 percent, 3). 2 of these respondents used this tool in geography class and one teacher practiced regional survey with GIS in civil engineering class.

2.3. Teachers' Opinions on GIS

As mentioned above, many geography teachers hardly use GIS, but 75.9 percent (41) of them answered GIS is useful to high school geography education.

As expected, the respondents thought there were many advantages to utilizing GIS in classes. An often-recurring answer regarding the advantages of using GIS in education was the visualization of data on maps. Also, some teachers pointed out these maps help to understand data and phenomenon in a study area. Furthermore, some teachers think this data visualization on the map motivates pupils and increases their interest in geography. Also, many of the general characteristics of GIS were mentioned, such as the ability to use fresh data, analyze data specially, deal with multidisciplinary theme, make thematic maps quickly and develop computer literacy. About one-third of respondents think that GIS can support individual learning, group works and lectures effectively.

Problems to install GIS are, in other words, reasons why almost all they haven't used GIS in classes. The biggest problem they mentioned was that it takes too much time for teachers to prepare for lessons. Their way of thinking is that it is hard to have classes with GIS, because they must teach so many things in the curriculum but hours of teaching are limited, and also there are so many things to do besides lessons, therefore they have no time to prepare for lessons. Some respondents explained that the education system in Japan, such as the national curriculum and university entrance examination, is a further reason why the system is rarely used. Once they think of the national curriculum, which has strict guidelines on education, they soon give up conducting lessons with GIS, even if they are interested in this tool. Also they said that computer environment, such as the number of computers or projectors with a high performance, is one of problems. Teachers themselves also are a problem. Pupils' motivation and their ability and GIS's unfamiliarity in society were also raised.

Previously, the most frequent answers as to the reasons for not using GIS were computer facilities in school, the prices of software and datasets and usability of GIS programs. Indeed, these points have been improved dramatically over the last few years. Almost all schools have increased the amount of installed computers and introduced a broadband Internet connection; therefore teachers and students can get GIS freeware and digital data from the Internet. From the viewpoint of using GIS, Japanese schools are in a favorable situation for utilizing this tool (Yuda and Itoh 2006). However, it is still true that some teachers say that they can't use this system because of the computer environment in schools. Here, we could see the existence of teachers who have realized that using GIS in education is largely concerned with themselves. They have realized that the problem is teachers themselves who say they hardly have time to prepare lessons or learn new skills and knowledge.

3. Japanese Teachers' Situation

The teachers answered they don't use GIS in geography class and don't know about that system, nevertheless most of them said GIS is effective for education. Furthermore they could imagine how they could use it effectively and their ideas are close to the reality of the tool. This seems a peculiar phenomenon, as they seem to understand the software, but claim to have never used it.

It's more than probable that teachers have had experience with GIS before without realizing that this is the case. In Japan there are in-service training schemes for teachers, which they obligatorily attend. It is quite possible that teachers had the incentive to refresh their knowledge and have taken some action. Although all schools already have computer facilities to use for lessons, only a few teachers try to use GIS. What we can read from their answers is their

struggles and dilemma: teachers' attitudes toward education, the curriculum and current situation in schools, and problems in the entire education system in Japan.

Originally, education in Japan has tended to have an excessive emphasis on rote learning. This way of education is directly connected to university entrance examination. Most teachers received this type of education and they have educated students in this way. Their experiences and what they were asked had been consistent.

Recently a paradigm for education has shifted to problem-based learning and decision making, and these ideas were introduced into the latest national curriculum in 1998. Since then, teachers might have tried to understand the importance and effectiveness of the new ways of teaching. They may know meanings of these terms, however, it must be very hard for them to absorb the ideas and put them into practice. Furthermore, the content of the new curriculum was reduced because of the selection of educational content with the installation of new methods of education. Yet pupils still need quality education for university entrance examinations, which require as much knowledge as before. Their teaching methods could not apply any longer. The education that teachers received is inconsistent not only with the current curricula but also with pupils' needs. Teachers are struggling in this severe situation.

This brings us back to GIS. It has been said that GIS could be used to enhance students' geographic skills and ability to think spatially (Bednarz 2004) and support their decision-making abilities (MacEachren 2000, Sugumaran et al 2004). For teachers, these characteristics of GIS may not seem relevant to university entrance exams. Sending many pupils to higher education is also one of the most important jobs for upper secondary school teachers. With this point of view, it is understandable that teachers don't want to introduce these new tools, when there appears to be little connection with these and entrance exams.

Furthermore, Japanese teachers not only teach their specialized subjects but also do miscellaneous things in school. Some respondents complained they do not have time to work for themselves, because they have too much work every day in school.

4. Obstacle to Install GIS

It is believed that the improvement of computer environments in schools, software and information on these systems would make GIS penetrate the field of education. But we have already realized that teachers don't use this tool, even if they have in place the kind of environment necessary to implement GIS. As mentioned above, some of the teachers stated one of obstacles to use GIS in class is the teachers themselves, a factor that requires further analysis.

Learning GIS requires a change in thinking. To study GIS, basic knowledge of maps is essential. At the same time, imagination is necessary to understand concepts of GIS. For example, users who have known GIS can accept the idea of layers as 'transparent sheets' on a map. There are many unfamiliar technical terms in the world of GIS. For a person who has thought that all geographical phenomena are on the same ground, it may be difficult to comprehend GIS- specific spatial structure and functions.

Furthermore, using GIS also requires different ways of thinking. From this point of view, it is possible to say that a key of utilization of GIS is teachers' understanding the concept of GIS and potential uses with these systems. Although many teachers know the term GIS, they can't grasp what GIS is because they cannot understand the core of GIS. They cannot feel close to this tool. Their feeling of distance to these systems is one of reasons that teachers stay away from this software and don't think about trying to use in class.

5. ESD and GIS: Possibility to Collaborate

The characteristic of ESD as a new paradigm is that future prospects and viewpoints of global citizenship are required. These perspectives are the values of ESD, and it is very important to solve these problems. Educational contents in ESD is not anything special in itself, topics like environmental education have been raised for a long time. It seems that ESD can become widespread in the field of education in Japan. But there are some problems; people are normally not aware of the values of ESD. For instance, everybody has a multilayered identity as citizen of local municipality, the state, the region and the world at the same time, but we rarely recognize this in our daily life. We have heard 'Think globally, act locally' many times. It must be easy to know what these words mean, although, in our daily life, it is very hard to imagine how our local activity is connected to the world. ESD also requires a flexible way of thinking, and people still require effort to understand the essence of this education and practice it. It is with this point the authors find similarities with ESD and GIS among teachers.

However, there is a big difference between ESD and GIS. ESD has already been practiced at all levels, from community to international, by governmental, civil society and NGOs, and private (UNESCO 2005). This difference is derived from the objectives of ESD to build a better future. GIS, on the other hand, is a powerful set of tools to reveal phenomenon in a certain area and to help decision-making. Although ESD can be practiced without any computer skills, computer skills and map literacy are required for GIS.

Considering features and functions of GIS, it is certain that this map tool is effective in ESD. But there is a big problem: only persons who know not only the objectives and methods of ESD but also functions of GIS can comprehend this effectiveness. Unless they know both, they may not be able to understand the compatibility of GIS and ESD. The number of people who can understand both ESD and GIS is very small. It must become necessary in society to develop human recourses to understand ESD and use GIS, in order to provide people with quality education for sustainable development using computer-mapping tools. New training programs integrating both ESD and GIS should be introduced for in-service teachers and future teachers.

6. Conclusion

This article focused on upper secondary school geography teachers. The authors then revealed the findings of a survey relating to the use of GIS in class and the status quo of teachers in Japan. Only a few teachers answered that they have used GIS in class, however, many teachers we also aware about GIS. Also the situation of teachers in school and reasons why they can't make use of GIS emerged from their answers. Then possibilities to utilize GIS in ESD were examined.

It is sometimes very difficult to change conventional ways of thinking. But each teacher has a responsibility as an educator to provide a quality education and to educate persons who sustain society and improve it. Education of K-12 and higher education never separate and circulate human resources and knowledge. From this point of view, we need broader discussions to deliver quality training to in-service teachers and better education to students who want to be teachers in society as a whole. Society should try to provide quality programs for utilization of GIS in the field of education, with a focus on the encouragement of teachers' motivation to learn more. Also universities or colleges which foster future teachers will need further changes in their curriculum, introducing ESD in addition GIS education and experience with this tool.

Some teachers said that GIS need more visibility in society for more utilization of this tool. Nowadays GIS is very close to our life, like maps or navigation systems on the Internet or other equipment. But GIS is constantly working in the background. If GIS were to become a well-known tool from tacit knowledge for some people, it would increase the understanding of GIS, and a better quality of learning in the education system will be established.

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Learning Sustainable Development With Mobile Devices

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Abstract

According to the theory of situation cognition, the instruction for conceptual knowledge is most effective when it is embedded in a phycsical and social environment. It would be easier to introduce the concepts of sustainable development to students by facing outdoor real environmental problems. In this study, a mobile learning module was developed for sustainability education, which involves a field trip along a local historical ditch and a decision-making exercise. The participants of trial tests were 8 highschool teachers and 14 tenth-grade students divided into 2 groups. Each student was provided with a mobile learning device, which is a PDA with location-aware learning materials and GPS. Students were guided by the mobile device to visit 5 waypoints showing various land-use types upon the ditch. They were asked to collect field data and interview local residents to evaluate 3 scenarios regarding the future development of the historical ditch. The results show that both teachers and students affirmed this module helped them to understand the local environmental issues as well as the concepts of sustainable development. Students stayed highly motivated during the learning activities because they felt they could find the locations and solve the problems by themselves with the assistance of advanced technology.

Keywords: Sustainable Development, Mobile Learning, PDA, GPS

1. Sustainability Education Outdoor

It is believed that the best knowledge construction occurs when learning takes place through action in an authentic world (Resnick 1987; Rieger and Gay 1997). For effective sustainability education, both theory and practice should be included in the curriculum. Besides, environmental issues often involve complex ecological, social, and economic problems. By engaging students to the environmental issues through field trips, it can help students to realize the complexity of the real-world and relate direct experience in the field to the concepts of sustainable development learned in the classroom (O'Connell, et. al., 2005).

Although a field trip for environmental issues is considered an effective teaching strategy for sustainability education, it is obvious that this approach is costly in terms of staff and resources (Higgins and Kirk, 2006). Even if some teachers are able to overcome the resource problems, usually the conventional staff-led fieldtrips are not so successful because of the inefficiency of gathering and speaking to many students in the field (Kent et al., 1997; Bellan & Scheurman, 1998; Tuthill & Klemm, 2002).

This study aims to design a mobile learning module for sustainability education. A Pocket Fieldwork Assistant (PFA) developed with mobile technology is provided to each student in a self-guiding field trip. We expect this device can help students to conduct a field trip without the company of teachers. It can also reduce the cost of a field trip and remedy the problems with leading too many students in the field. Meanwhile, students can gain direct experiences about sustainable development and have fun of being an active learner.

2. Mobile Learning and Fieldwork

Mobile learning (m-learning) is the intersection of mobile computing and e-learning (Shepherd 2001). Nowadays, people can retrieve a great amount of Internet data from mobile devices. Many people are unaware that they are already involved in mobile learning in their daily lives, for example, when looking for the definition of a new word with a cell phone on a bus. One major application of m-learning relates to tourist guides. Museums could provide hand-held devices that allow users to take personalized tours and have audio tutorials of the exhibitions. (Abowd et al. 1997).

It's suggested that m-learning can possibly best be applied to three kinds of situations: (1) when specific knowledge should be retrieved at a certain moment; (2) when data collection or analysis is undertaking in the field; and (3) when learning content is strongly connected to the user's current context (Trifonova, 2003). It appears that geographical fieldwork frequently resides in such situations. Many educators have utilized mobile technology to support students learning in the field. For examples, Rieger and Gay (1997) developed a hand-held prototype for a plant genetics course, which could bring just-in-time multimedia resources such as plant characteristics, historical and geographic background information into the outdoor plant laboratory. Pascoe (1998) created a context-aware electronic notepad, which could automatically add the user's real-time information including location, date, and time to every note and enable the user to see them instantly on a map. Kravcik et al. (2004) divided students into two groups. One group went into the field for research investigation with mobile devices while the other group stayed in the classroom and received the real-time data from the field group via a wireless network. The group in the classroom was also responsible for analyzing the field data and providing necessary information to the group in the field. These studies demonstrated that mobile technology can facilitate observation, data collection, group communication, and problem solving in the field. In the meantime, it could significantly boost motivation as well as the outcomes of learning.

3. The Design of Pocket Fieldwork Assistants (PFA)

In this study, we tried to integrate a learning module of sustainable development into a mobile device named PFA. Equipped with a GPS, PFA can provide navigation information and location-aware learning materials to students during the fieldtrip. Students can also use PFA to collect field data and upload their findings to share with each other in a website. The feasibility of the PFA was evaluated by the local highschool teachers and students in a fieldtrip along the Liugong irrigation ditch, a historical heritage under new development in Taipei metropolis.

3.1 Learning Objectives

The Liugong irrigation ditch used to play an important role in the economic development and water supply of Taipei city, but at present it's functioning as sewerage and is heavily polluted due to the neglect of the nearby residents. Recently, the future development of this historical heritage brings the public attention to the importance of the ecological, social, and economic dimensions of sustainability. It provides a great opportunity for introducing the concepts of sustainable development to students. Therefore, this study provided learning activities to help

Table 1. learning objectives of the fieldwork

Learning Aspect	Learning Objectives
Cognitive Aspect	● Realize the environmental problems of the irrigation ditch at present ● Understand the funtions and impacts of the ditch in the past ● Understand the concepts of sustainable development
Skill Aspect	● Learn to use the Pocket Fieldwork Assistant ● Collect field data to answer specific questions ● Complete a report to evaluate different development plans
Affective Aspect	● Care for the local environments ● Learn to cooperate with team members ● Learn to respect different opinions

students to understand the history of the Liugong irrigation ditch and reflect on its future development (Table 1). After outdoor fieldwork activities, the students were given three proposals for the future development of the irrigation ditch. Students were asked to choose one out of the three proposals, explain their rationale, and provide evidences from the field to support their decision.

3.2 The Pocket Fieldwork Assistant (PFA)

To guide students throughout the whole fieldwork process, we developed the PFA with two main functions, namely, route guide and learning support (Table 2; Figure 1). The design of the functions demanded an understanding of the storyline of how students got to every field spot and what kind of learning exercise was assigned to them.

3.2.1 Route Guide

There were five pre-defined field spots in the study area. The PFA would give students the information of transportation for each spot. Students could reach these spots by foot, bus, or Taipei Municipal Rapid Transit.

3.2.2 Learning Support

Students act as active explorers instead of passive tourists in this learning module. According to the inquiry-guided pedagogy, the PFA will give learning support with the form of questions and activities (i.e. interviews, taking pictures, and making notes). Students are asked to finish tasks through action. The activities of data collection and question answering are all problem-based, which are related to the evaluation of the developments surrounding the irrigation ditch. As students approach the field spot, the PFA will automatically prompt learning support. Besides, the PFA provides students with reading resources and a local map of the irrigation ditch for helping them to answer questions in situ.

4. Evaluation

We conducted two phases of evaluation to understand how high school teachers and students perceived the mobile learning module. The first phase was a pilot evaluation to make modifications to the PFA prior to the formal field experiment. Members in our laboratory spent 6 hours going through all field spots assisted by the PFA. Further more six high school teachers volunteered to participate in testing the PFA in the field. The following two major modifications made to the PFA based on the feedbacks from this trial run.

Table 2. Functions of the PFA

Functions	Components	Tool description
Route Guide	Transportation guide	Provide the transportation information of each field spot, like taking bus no. 642 or utilizing the GPS navigation tool.
	GPS navigation tool	Show the location of the user on the map. Users can select a destination and this tool will constantly provide directions to guide the user.
	Image navigation tool	Show directions on pictures to guide students to destinations where the GPS does not work properly.
Learning Support	Assignment prompter	Ask students to take actions, such as answer questions, interview residents, take pictures, and take notes when approaching every field spot.
	Field map viewer	Provide the map of the irrigation ditch and show the locations of field spots.
	Knowledge archive	Provide the knowledge base of the irrigation ditch.
Other	Time warning messenger	Help students to finish the tasks on time.

Figure 1. Left to right: GPS navigation tool, Image navigation tool, and PFA main screen

First, although we tried to design an easy-to-use device, it was still necessary to arrange a tutorial course of PFA for students. We designed a trial exercise before the fieldtrip. Students had to get to a predetermined spot in their school campus to be familiar with the basic functions of the PFA. Secondly, the GPS navigation tool did not always work properly because of the multi-path effect around crowded buildings in the urban area. We developed the image navigation tool as a supplement particularly for certain areas with the significant multi-path effect.

In the second phase, there were 2 high school teachers and 14 students participating in the experiment for the full module. We obtained the results based on pretest-posttest comparisons, questionnaire investigations, interviews, learning assessments, and researcher observations. Students indicated that this fieldwork enhanced their relationships among team members. It raised their awareness of the local environment issues and provided insight into the complexity of the real-world planning work. They felt independent, fresh, and impressed throughout the process. As for the performance of the PFA, students regarded it as a good assistant in conducting fieldwork. The navigation tool could guide them quickly to every field spot and help them to collect field data. Teachers pointed out that the PFA had a friendly user interface, which could assist students in fieldwork tasks. The inquiry-guided content design of the PFA could engage students throughout the whole process in the field.

As a whole, this mobile learning fieldwork received positive feedbacks from all teachers and most students. We still observed some drawbacks of the PFA during the field trip to be improved in the future. First, the mobile device should send real-time information such as the student coordinates and their learning progress during the trip. Secondly, the PFA should record student tracks to make sure they really conduct the field trip. Besides, this learning module is self-guiding and brand new to students. Students need more hands-on experience of the PFA and more background information regarding the concept sustainable development related to the local environmental issues before they go into the field.

5. Conclusions

Mobile technology has great potential to facilitate sustainability education. By integrating the learning module of sustainable development into a mobile device, students were able to conduct a self-guiding fieldtrip to investigate the local environmental issues. The PFA gave highschool teachers and students new perceptions of doing fieldwork. Teachers regarded the PFA as a useful tool for assisting students in the whole learning process. This m-learning approach produces several benefits. It improved understanding of the concept of sustainable development by engaging students to real-world problems. It saved some practical troubles of leading many students in the field as students were learning independently. It reduced the cost of transportation. Furthermore, students experienced the fun of being an investigator.

The PFA needs improvements in two ways. First, the function of real-time communication should be added. It can help teachers to monitor students in the field, provide necessary supports right away, and perform real-time assessments. Secondly, the program should provide editing tools for teachers to easily customize their teaching materials. A PDA smart phone should be a better platform than a PDA alone to implement these modifications.

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The Importance Of Multimedia Datashow Projector Usage (Computer-Assisted Presentation) In Geography Teaching

Ali Özel (Kütahya)

Abstract:

The results of a survey conducted with a questionnaire filled in by students enrolled in a geography course at Dumlupinar University College of Education in Kütahya, Turkey, indicate that computer-assisted presentations help students to better understand the subject of geography. The use of instructional technology, with which abstract geographical themes become more concrete and lead to permanent learning, is an inevitable component of today's education system. Many topics of geography can better be understood if students are provided with opportunities to experience these topics directly, for example by excursions or observations. However, geography teachers do not always have the means to offer these kinds of opportunities. Most of the time, teaching is limited to the classroom setting. The results of a number of studies show that the usage of materials in geography teaching is not sufficient due to different reasons. A common obstacle may be the problem of moving back and forth the geography materials between classrooms each time. Today, multimedia datashow projectors would be a solution to solve this problem. With the help of computer assisted technology, geographical subjects can be brought into the classroom via different computer programs and Internet easily. In this respect, computer-assisted lecturing might be a vital solution to enrich geography teaching and learning.

Keywords: Multimedia Datashow Projectors, Technology, Geography Teaching

1. Introduction

Teaching is defined as all the processes applied for achieving learning and desirable behavior change on individual. In other words, teaching is the act of furnishing the student with knowledge. The use of visual and auditory methods together is required to perform the desired behavior. Research studies show that in the teaching and learning process the sense of vision and hearing has a great effect on learning (Duman & Atar, 2004; Gungordu, 2003; Sengun & Turan, 2004). All tools and aids for teaching used to develop the student's knowledge, skills, and attitudes are called 'teaching materials' (Demirel, 2002). The use of material in teaching is of great significance to provide permanent learning and to support the teacher.

As known, "geography is a science connected with human life and the effects of human activity. It examines a phenomenon participated in or lived through" (Doganay, 1993: 139). Accordingly, geographical actions and occurrences can be carried into the classroom setting by means of visual materials (Yasar, 2004). Therefore, it is crucial to use materials in geography courses. In a survey carried out to find how geography subjects in social sciences are given at the seventh grade students, Kayali (2000) found that 75 % of the teachers always and 25 % of them often make use of maps in their courses. It was also found out that 12.5 % of the teachers always and 37.5 % of them sometimes make use of multimedia datashow projector while 50 % of them never use this equipment in their courses. The same study also shows that models and samples are occasionally used by 25 % of the teachers whereas they are never used by

75 % of them in teaching geographical subjects. Moreover, the study states that 12.5 % of the teachers sometimes make use of audio-visual equipment such as television and video player during their geography courses while 87.5 % of them never use these media.

The observation, that learning environments that address many senses, lead to better results, is very old (National Science Foundation, 1977; as cited in Açıkgöz, 2007). This issue has alo been an increasing concern in geographic education particularly in the past several years (Dechano & Stoltman, 2003). The topics of a geography course are predominantly concerned about excursion and observation as well as practice. Also fieldwork in geography is accepted as an important part of education. Thus lecturers generally regard it as one of the most effective and enjoyable ways of teaching and learning for students (Kent, Gilbertson & Hunt, 1997). Yet, geography teachers do not always have these kinds of opportunities since teaching is restricted to the classroom setting. Therefore, classroom settings should be adjusted to nature. Thanks to this adjustment, learning and teaching difficulties can be overcome more easily. An appropriate educational technology is the multimedia datashow projector and the use of it is considered to shed light on several problems. People' desire to live in a more peaceful and contemporary atmosphere brings rapid technological advances. However, technological advances have not been noticeably related to education until now. Recently this case has begun to indicate slight variations. Nowadays many countries make significant arrangements in their education systems. The major role in these arrangements is given to computers. On the other hand, the most significant issue in this process is to determine the principles concerning how to use computers in education. It is essential to examine the purpose why computers are placed at schools. For instance, will the computer form the essence of the education program or will it be supplementary to the education program? It can be seen that the whole school does not benefit from the computer adequately and computers are abandoned to their fate. This matter occurs as a result of teachers' and school administration's not being aware of how to use the computer for the purpose of teaching.

The use of educational technology is inevitable in today's education system. Since numbers of students attending higher education increase and the diversity of the student population becomes greater in social background, ethnicity, disability, previous educational and life experience, the challenge of providing appropriate and fulfilling learning experiences for all has become more vital (Healey, Kneale & Bradbeer, 2005). Thanks to the educational technology, abstract subjects can be made more concrete and at the same time be taught permanently. Educational technology attracts the students' attention to the subject by motivating them in the learning process (Parke, 1966). In this respect, the aim of this study is to evaluate the usage of multimedia datashow projector (computer-assisted presentation) in geography teaching with respect to students' views and determine the contribution of teaching and learning process since geography course cannot be learned or taught only from the course books and by only exposition method. Students become more involved and active if they experience learning (Goodhew, 2005).

2. Method

2.1 Participants

The data for this survey was collected from 363 prospective teachers enrolled in the course of "geography" at the departments of Turkish Language Teaching, Elementary School Education, Social Sciences Education, and Pre-school Education Departments at Dumlupinar University College of Education in Kütahya, Turkey in order to determine their attitudes towards computer-assisted lecturing in 2006- 2007 academic year. While 55.6 % (202) of the surveyors were female, 44.4 % (161) of them were male.

2.3 Data Collection Instrument

 A questionnaire including fourteen questions was developed by the researcher and administered to the students in class sessions.

2.4 Data Analysis

The data were analyzed by computing frequencies and percentages.

3. Results

The results of the study showed that over 80 % of the students have strongly positive opinions about the case. Moreover, it was found that 86 % of the students strongly agreed with that "this kind of a lecturing encourages the students to search and think more" whereas 89.3 % of them strongly agreed with "it facilitates note-taking". 85.4 % of them strongly agreed with "I would like to learn how to prepare a computer-assisted lecture". Furthermore, 89.5% of them strongly agreed with "this kind of a lecturing makes the instructional environment more comfortable for the teacher". Table-1 presents the students' responses in details.

Table 1

Dumlupinar University Education Faculty Students' Opinions Concerning Computer-assisted Geography Presentation

		Strongly Agree		Agree		Somewhat		Disagree		Strongly Disagree	
		f	*%*	*f*	*%*	*f*	*%*	*f*	*%*	*f*	*%*
1	Instructional difficulties can be better overcome with computer-assisted lecturing.	310	85.4	22	6.1	14	3.9	10	2.8	9	2.4
2	Lectures prepared by using a computer program make knowledge more intelligible, perceptible, and permanent.	322	88.7	18	5	16	4.4	5	1.4	2	0.6
3	I would like to learn how to prepare a computer-assisted lecture.	302	83.2	15	4.1	25	6.9	6	1.7	15	4.1
4	I would like to buy and use computer-assisted pack lecturing programs.	308	84.8	24	6.6	11	3	11	3	9	2.5
5	That kind of lecturing makes the instructional environment more comfortable for teacher.	325	89.5	22	6.1	9	2.5	4	1.1	3	0.8
6	That kind of lecturing encourages the students to search and think more.	312	86	10	2.8	20	5.5	9	2.5	12	3.3
7	It attracts the students' attention to the class more and motivates the students.	330	90.1	21	5.8	4	1.1	3	0.8	5	1.4
8	It facilitates note-taking.	324	89.3	13	3.6	6	1.7	8	2.2	12	3.3
9	It is possible to bring the nature to the class via such a lecture.	313	86.2	14	3.9	21	5.8	12	3.3	3	0.8
10	I want to lecture that way when I become a teacher.	307	84.6	19	5.2	22	6.1	8	2.2	7	1.9
11	Data show is being used in our geograph courses in the university.	240	66.1	39	10.7	52	14.3	21	5.8	11	3
12	Was the use of materials in geography course in your secondary education enough?	60	16.5	30	8.3	25	6.9	40	11	208	57.3
13	Was the use of data show in geography course in your secondary education enough?	10	2.8	8	2.2	9	2.5	21	5.8	315	86.8
		f				*%*					
14	Do you think the following subjects of geography are suitable for computer-assisted course presentation?										
	Physical Geography	330				90.9					
	Human and Economic Geography	10				2.8					
	Regional Geography	23				6.3					

Moreover, the results showed that over 80 % of the students have strongly positive opinions about the case. It was found that 86 % of the students strongly agreed with "this kind of lecturing encourages the students to search and think more" whereas 89.3 % of them strongly agreed with "it facilitates note-taking". 85.4 % of them strongly agreed with "I would like to learn how to prepare a computer-assisted lecture". Furthermore, 89.5% of them strongly agreed with "this kind of lecturing makes the instructional environment more comfortable for the teacher". Table-1 presents the students responses in detail.

The findings also demonstrate that computer-assisted lecturing is favorable in terms of attractiveness, understandable and permanent by the participants in geography teaching. Furthermore, the data revealed that multimedia datashow projector material use was not sufficient in their secondary education (86.8 % of them never met this kind of course presentation) whereas it was satisfactory in their university education. Furthermore, the participants reported that physical geography subjects (90.9 %) are more suitable for computer assisted course presentation.

4. Discussion & Conclusion

The findings of the study appears to validate the research study conducted by Duman and Atar (2004), which states that the use of multimedia datashow projector and oriented technology makes a positive contribution by addressing to the students' visual and audio senses as well as enriching the process of attaining knowledge, for example through animated demonstration of the topic of climate elements such as humidity, wind, pressure and rain with the use of data show.. The results of this study emphasize the facts that the presentation of climate knowledge with the use of multimedia datashow projector and keeping the students informed about the teaching goal improve their learning styles, methods, and techniques. Classroom environments should be designed for such kinds of presentations. In order to ease the presentation of geography subjects, some package programs should be prepared to be used in teaching geography. This condition (as it will be difficult for geography teachers to prepare these programs by themselves) may encourage the geography teachers to use multimedia datashow projection and there would be an increase in the usage of similar technological tools.

Looking at the result of many surveys and this study (12th and 13th questions), it is seen that the usage of materials in geography teaching is not sufficient. Inadequate geography classrooms and inconvenience of the geography materials between classrooms are the most important two reasons of the problems. Thanks to Multimedia DataShow projectors, this carriage problem ends and geographical materials in the nature are combined and carried to the classroom by computer programs and Internet without any difficulty. The availability of the classes could be the reason for satisfaction of students in terms of data show use in the present study.

In conclusion, the advantages of Multimedia Data Show Projector course presentations in geography teaching could be as follows;

1. It enables teachers to create a stimulating atmosphere. In other words, it makes the lesson interesting and so students don't get bored.
2. With the Multimedia Data Show Projectors, there is no need to carry maps, slides, overhead projector or other materials to the classroom anymore. In this way, it provides ease and practicability.
3. Abstract concepts and incidents can be easily based on facts.
4. During their courses, in order to save time, teachers sometimes quickly draw graphics, patterns, and maps on the board. This drawings might include faults or it might be diffi-

cult for the students to understand therm. These problems would completely disappear with Multimedia DataShow Projectors.

5. It provides an effective and permanent teaching.

6. It prevents students from memorizing and quickens the perceiving/understanding process.

7. The valuable visual teaching techniques in teaching geography will be combined.

8. Lessons will be more permanent and attractive when figures, graphics, pictures, animations, videos, and sounds are added.

9. It motivates students and so draws their attention.

10. It keeps students' attention alive.

11. It simplifies the concepts which are difficult to understand in physical geography.

12. It carries the places that it is impossible for the students to see or go to throughout their lives; or the incidents and creatures that are impossible to have in class, into the classrooms.

13. The motivation process would be quickened with the aid of audios, visuals, and music.

14. Via this method, teachers can revise the points that students couldn't understand again and again.

15. The errors and the mistakes on the written text can easily be corrected.

16. It can store the datum without any difficulty and can transport them practically wherever you want.

17. One of the most important advantages of using multimedia datashow projection is to be able to connect to Internet. As known, Internet can connect several computers to each other and can be used for all-purposes everywhere by every person regardless of their knowledge level. Especially on behalf of education, it has been the indispensable technology. Via Internet, not only we can reach to information inside a building or a region but we also can reach to information all over the world; every map, profile, slides, and photographs or to an association and an establishment to present opportunities for students in student-centered learning process (Denbeste, 2003). We can even reach to people and their studies. Therefore, with a multimedia datashow it is possible to share all of these with the students in a classroom environment.

The use of Computer-Aided Multimedia DataShow Projector should be spread to each geography classroom. To achieve this, geography teachers should be encouraged first and if necessary, they should be given some in service training to make such kind of presentations. As a result, in order to have an efficient learning in geography teaching, the knowledge and the usage of Multimedia DataShow Projector techniques by geography teachers will be useful for learning geography. Of course, in order to do these, some financial sources should be transferred to the teaching and projections, together with computers, should be provided for teachers.

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Symposium Session: Attitudes and Preconceptions

Sustainable Development And Geography Curriculum Of 2005 In Turkey: How Geography Student Teachers Conceptualizes Sustainable Development

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Abstract

Sustainable development is a concept that has been ignored in geography education until recently in Turkey. Since there is quite limited literature available in Turkish concerning the issue, it is not a well-understood concept by students and also by geography teachers. However, the geography curriculum of Turkey for secondary schools was changed in 2005 and it brought a new approach and content for geography education in Turkey. Then, this paper, firstly, discusses the new geography curriculum of Turkey for secondary schools particularly in the context of changes brought about with it in terms of the concept of sustainable development. It analyses how the issue is considered in the new curriculum in terms of content, skills, values and attitudes. Then, the paper reports about a study carried out with geography student teachers on their perception of sustainable development. Data collected through interviews with geography student teachers in Gazi University in Turkey. Geography student teachers usually associate the concept with politics and many consider 'development' more important than 'sustainable development'. Finally, we draw conclusions and make recommendations on how the issue should be dealt with in secondary geography classes and geography teacher education programmes in the context of new geography curriculum.

Keywords: Geography Curriculum, Sustainable Development, Geography Teacher Education, Turkey

Introduction

Humanity has always been concerned with development and living in better conditions. But these issues started to be considered increasingly more important especially in the second half of 20th century. The reason for this is the rapid population growth in the world and, in turn, the pressure put on the environment and natural resources because of the overpopulation. The rapid population growth has resulted in exploitation of natural resources and limiting the economic development. In this respect, the planning of future in the context of the relationships between population, environment and natural resources has become one of the most important aims of humanity. Therefore, the population growth, consumption of resources, environmental problems, and protection of the world for the next generations have become the current issues in recent times. The interactions and relationships between these issues are considered through the concept of sustainable development (SD). Therefore, having political, economic, social and environmental dimensions, SD compromises multi-dimensional relations (Hopkins-Ospina, 1996)

SD has been subject to many cross-disciplinary researches and it is also an important area of study in geography. However, SD has been ignored in geography education until recently in

Turkey. Since there is quite limited literature available in Turkish concerning the issue, it is not a well-understood concept by students and also by geography teachers. For this reason, this paper first looks at the relationship between SD and geography education. Then, it goes on to define the place SD in the 2005 Geography Curriculum of Turkey. Finally, it reports on the study that carried out with geography student teachers on their perception of SD.

1. Geography Education and Sustainable Development

The concept of SD appeared initially in 1970s and it acquired a formal entity after the Brundtland report (1987), entitled as 'Our Common Future' and published concerning the environmental problems that are threatening the world's future (TÇSV, 1991). SD could be basically defined as maintained development, being in harmony with environment and effective use of resources. The UN Environment and Development Commission has defined SD as 'development that meets the needs of present without compromising the ability of future generations to meet their own needs' (OECD, 2001: TÇSV, 1991: Barlet, 2006; Murcott, 1997; Daly, 2006)).

SD is considered to be having three components, namely environment, society and economy. These concepts are interrelated to each other and cannot be thought separately. (McKeown, 2002). Since SD is concerned with increasing life and environmental quality and sustainable use of resources, it is important to constitute a balance between environment, economic development and social welfare through SD. Likewise, geography is also concerned with these issues, so geography education has a significant role in the realization of and learning about SD. Put differently, geography education helps people to have a consciousness and learning experiences with regard to SD because geography has two basic components, the nature and human. One of the most important goals of geography is to provide individuals with a consciousness in terms of the human and natural processes.

Unlike the past, today the most social, political, economic and environmental events that happen in local or national scale have effects on global scale. This idea reflects that many events happening in different places are interconnected and their consequences might be observed globally. This reality forces us to reflect upon above mentioned issues related SD in the context of whole world and, in turn, raise a global consciousness with regard to SD. In order to achieve such an end, everyone has some duties. Yet the most important duty falls upon our education systems. They should aim to educate people as responsible citizens who are aware of the consequences of over consumption, of a need for effective use of energy resources, and of environmental problems. In this respect, geography is the foundational and most important subject for providing students with such consciousness with regard to SD (Huckle, 2006). In recent years, the use of ICT has started to occupy an important place in education systems. On this account, ICT might also play an important role in the realization of SD because it helps us in using the resources more effectively and in finding new, alternative and renewable energy resources.

It is impossible to sustain live on Earth without relying on natural resources. But critical point here is to realize development in harmony with the nature. As stated earlier, teaching-learning activities, particularly geography teaching and learning has an important role in this. For that reason, the next, we will examine the 2005 Geography Curriculum of Turkey in general terms and, then look at how SD is considered in the curriculum.

2. 2005 Geography Curriculum and Sustainable Development in Turkey

Rapidly changing world conditions and increased interactions between countries have forced countries to re-think their education systems. For this reason, education systems are being reformed to create individuals who can adopt current world conditions and who could design

the future. In this respect, Turkey has been going through an educational reform since 2002 and Geography Curriculum is changed in this process and has been put into effect since 2005. The new curriculum has brought many fundamental changes to geography education. Previous curricula in Turkey were organized only around some themes and had an objective-based nature. The new geography curriculum has brought a new approach to geography education in Turkey in terms of the teaching-learning process, the content, class hours, teaching materials, and pedagogic approaches. In this respect it was developed in the context of constructivist theory (MEB, 2005).

The main axis of the geography curriculum is composed of natural and human systems and their interactions, processes, and actions as well as spatial patterns resulting from those interactions. The curriculum has a spiral, progressive and flexible structure that is organized around the same themes in all years but with a clear focus on developing geographic consciousness in students. According to the curriculum, the purpose of geography and the reasons for teaching it is to enable students to gain a geographic consciousness with regard to their home, locality, region, nation and the world. Therefore, the study of geography is considered to be representing the human endeavor to know more about themselves and the world around them (MEB, 2005). The conceptualization of this overriding aim could be seen below in Figure 1.
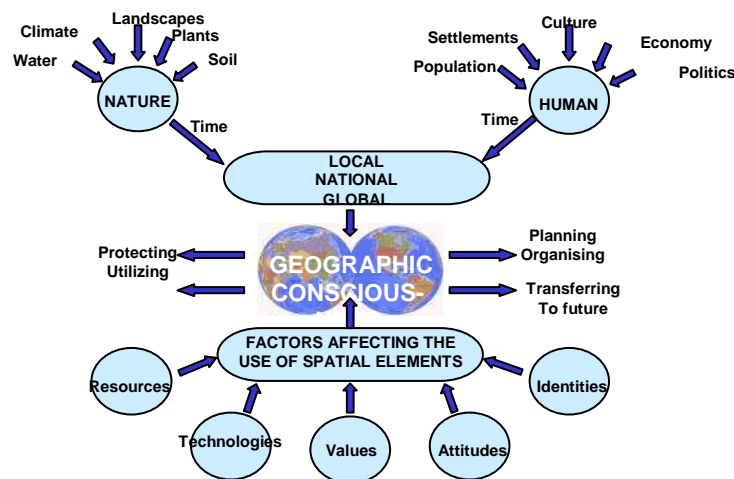
Figure 1. The subjects of Geography and the Elements of Geographic Consciousness

As seen from the figure, students are to gain knowledge, skills, values and attitudes in terms of the issues related to the nature and human in the context of local, national and global scales. In developing geographic consciousness, it is important to consider issues of preservation, utilization, ownership, planning, organizing, and a need for transferring to future. Furthermore, the content consists of five learning themes; namely natural systems, human systems, a spatial synthesis: Turkey, global environment/setting: regions and countries, and environment and society. Each theme has various objectives under itself that need to be fulfilled through the year (MEB, 2005).

With the new curriculum, SD is introduced to geography education for the first time in Turkey. In this respect, the new curriculum emphasizes the prudent and effective use of resources without exploitation and a need for raising consciousness concerning the environmental problems. In fact, the new curriculum has in total 147 objectives whose overriding aim is, as stated before, to provide students with geographic consciousness. In general terms, gaining geographic consciousness could be considered to be an important stage in terms of realization of

SD. In particular, the learning theme of 'the environment and society' of the curriculum is directly linked and related to SD. Furthermore, 2005 geography curriculum has 14 aims and 6 of them are directly related to SD (MEB, 2005). These are:

- *Aims to develop student´s awareness of ownership with regard to spatial values (the productions of nature and humans) starting from near environment to national and global scales.*
- *Aims to develop student´s responsibility towards the working of ecosystems.*
- *Aims to provide students with an understanding of the importance of spatial planning for harmonious togetherness and sustainability of the merits (values) that are produced through human and natural systems and aims to develop student´s awareness of prudent use of resources.*
- *Aims to examine the spatial processes in the context of local and global interactions.*
- *Aims to provide students with an understanding of the importance of development to be in harmony with the nature.*
- *Aims to provide students with an understanding on how to evaluate the natural hazards and environmental problems and aims to develop in student an understanding of the measures in terms of preserving the nature.*

As will be seen, the new geography curriculum places great significance on SD and 6 of its primary aims are developed in the context of SD.

3. The View of Teacher Training Students in Geography about Sustainable Development Education in Turkey

Although SD is a cross-curricular issue and included in the curricula of different subjects, it has a more special and important place in geography curriculum. With this in mind, this study looks at the opinions of geography student teachers in Gazi Education Faculty of Gazi University concerning SD. It is important to know what future geography teachers think about SD because they will be in a position to implement the new curriculum. A questionnaire is developed for the data collection, and conducted with 41 geography student teachers in May 2007. 21 of the respondents were male, 20 of them were female. The data is analyzed by using SPSS.

Table 1. The descriptive statistics on the respondents' opinions regarding SD

Dimensions	1.Finding SD important	2. Accepting that there are things to be done individually for SD	3. Seeing SD as a global issue
N	41	41	41
$\overline{X}$	1.42	1.36	1.08

We basically examined three dimensions seen in the above table (Table 1). The statements that compose each dimension were prepared by using a likert scale. The respondents were asked to state whether they 'agree' or 'disagree' with the statement or 'don't know' the statement. The answer for 'disagree' gets 0 point; 'don't know' 1 points and 'agree' 2 points. Table 1 shows the average points for each dimension and as seen, in all dimensions average is more than 1 point. Then according to these findings, in general terms student teachers consider SD as an important issue and think that individuals could do something about it. They also think that SD is a global issue.

Table 2. Descriptive Statistics showing student teachers' learning of issues related to SD

Topics	The causes and effects of pollution	The reduction of disposals and recycling	Sustainable use of natural resources	Sustainable food production	The expansion of global economy and its effects on environment	The Protec-tion of natural life
N	41	41	41	41	41	41
The number of respondents who stated that topics are covered in their educa-tion	37	23	31	25	40	35

The majority of student teachers state that the issues listed in Table 2 which is related to SD are covered during their education in the university.

Table 3. The result of T-test on whether student teachers find teaching SD important or unimportant

	N	$\overline{X}$	s	t	p
I find SD important	27	10.44	1.64	3.08	.004
I find SD unimportant	14	7.85	3.73		

There is a significant difference between those student teachers who think that SD is an important issue to be taught in secondary schools and those who consider SD as unimportant (t $_{(39)}$ = 3.08 p<.05). While the average point of those who find SD important is 10.44, the average point of those who find SD unimportant is 7.85 (Table 3). Therefore the majority find SD important issue to be taught secondary school students.

According to the above findings, student teachers generally find SD important and think that they have adequate education during their training at the university with regard to SD. In the realization of SD there are things to be done both at the individual and global level. The majority expressed a need for raising awareness in terms of SD. For example, one student teacher stated that 'instead of teaching pupils collecting litter, we have to teach them not to dispose litter in the first place'.

4. Conclusion

Due to the rapid population growth in the 20th century and because of the fact that resources are limited, we have been increasingly putting pressure on the natural resources and environment. Then, there is an urgent need for us to foster development without using up limited resources and to transfer them to next generations while meeting the needs of increasing population. As a result of this, SD has become a current and important issue for humanity. Likewise, it has been given great importance in 2005 Geography Curriculum of Turkey. SD is stressed in the aims of the curriculum and had many objectives directly related to it. Thus, the curriculum, whose main aim is to provide pupils with geographic consciousness, aims to educate today's and future's individuals.

According to the findings of this study, the student teachers who took part in the study believe that they have an adequate education with regard to SD during their education at the university. They also believe that they have an important responsibility in raising the issue in their future practice. In this respect, the student teachers perceive SD as an important and global

issue. They also think that the issue should not only be raised in their classes but also through various activities such as seminars, the work of student clubs, and meetings. However, what current geography teachers think about SD is unclear and needs to be explored with further research. Since SD is introduced to geography education in Turkey by the new curriculum, there might be a need for in-service training for teachers in terms of SD.

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Sustainable Development In Opinions Of Primary Student Teachers And In Pre-Service Teacher Education In Turkey

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Abstract

This paper looks at the learning experiences of primary student teachers with regard to the concept of sustainable development (SD) through their pre-service programmes and how primary student teachers conceptualise SD in Turkey. SD has increasingly become a concept that indispensable in any discussion of human impact on the environment and development. In this respect, although there has been a growing interest and, in turn, body of knowledge being created on sustainable development from the view of different disciplines and particularly from the view of geography, it is not a well-known issue and concept in Turkish context. The same idea could also be applied to geography education in Turkey because there has been quite little recognition and literature available in geography tradition of Turkey in terms of sustainable development until recently. Based on the data collected through questionnaires with student teachers, this paper, firstly, examines student teachers' opinions of and attitudes towards the concept of SD. The majority is not sure about what the term SD means and associates the issue mainly with more technical terms and tends to ignore various dimensions of sustainable development. Then, it goes on to examine the ways and the role of the programmes in defining and disseminating knowledge on SD in two universities of Turkey. The coverage of SD in both universities is usually quite superficial with very limited inquiry opportunities and usually without any references to critical and social aspects of sustainable development.

Keywords: Sustainable Development, Student Teachers, Teacher Education, Teaching SD, Geography Education

1. Introduction

The most internationally recognised definition of sustainable development (SD) is 'meeting the needs of the present without compromising the ability of future generations to meet their own needs' (Brudtland Commission, 1987, cited in Earth Charter, 2005). This definition of SD calls for an interdisciplinary approach as it involves in the complex relationships between humans and the nature. However, this should not only be considered as an environmental issue because we can already see the dramatic social and economic consequences of unsustainable development. In this respect, SD 'is generally thought to have three components: environment, society, and economy…[and] the well-being of these three areas is intertwined, not separate (McKeown, *et al.*, 2002: 8). Expressed differently, SD should aim not only to combat environmental degradation but also combat poverty and promote social and economic development.

Since geography is interested in human-nature relationships in the context of environment, society and economy, it is a taken for granted field where the issue of SD could be dealt with through an interdisciplinary approach (Houtsonen, 2004). Indeed, during the last ten years education for sustainable development (ESD) has started to be an essential part of geography

education in many countries. On this account, geography tries to understand how people intervene in the world's natural and social processes and in turn, how spaces, places and environments are affected by such intervention. Unless we understand how we affect and change the environment, we are likely to damage the environments that we depend on (Bailey, 1987). Therefore, one of the main goals of geography education is to develop in students an understanding of spatial dimensions of human-nature relationships and of sustainability by paying particular attention to how human-environment relationships affect and change places. Today, such understanding is very important because of 'global threat of unsustainable development causing damage to such an extent that the planet cannot sustain human life, leading to a world where future generations would no longer have the resources to meet their needs' (COF, 2005: 12).

When we consider ESD in particular, it is a relatively new concept and developed from environmental education (Scheunpflug and Asbrand, 2006). But, as Bonnett (2003: 676) states, it involves more than environmental education:

> It brings into harmony two highly attractive but potentially conflicting notions. First, is the idea of conserving or preserving those aspects of nature that are valued but that are currently endangered through depletion, pollution and so forth. Second, is the idea of accommodating ongoing human aspirations to 'develop', that is, in some sense to have more or better, where this necessarily has implications for natural systems.

Then, ESD should be considered as a three dimensional effort developed through environmental, social and economic contexts (Summers et al., 2000). Thus, ESD has to make links between issues that are usually presented as disconnected such as 'the social and environmental consequences of our purchasing choices and use of resources, the interaction between people and the environment we live in, the human consequences of global environmental challenges such as climate change' (COF, 2005: 10). In this respect, ESD should enable 'people to develop the knowledge, values and skills to participate in decisions about the way we do things individually and collectively, both locally and globally, that will improve the quality of life now without damaging the planet for the future."(CfESD, 1998: 3). Such aims of ESD strongly imply that humanity needs to reconsider its current environmental, social and economic development and change them to ensure a SD in the world (Calder and Clugston, 2005). This also suggests that we have to change our ways of living and life-styles. These could be only achievable through changing our habits and more importantly mind sets on the way we see the nature and the social world as well as our relationships with them. Changing mind sets is a hard job that needs to start in the family. Primary school education and in particular geography education we give to young pupils also plays a important role in the maturation process of pupils; a role in constructing their perceptions towards social world and human-nature relationships. In this respect, pupils should be provided with following knowledge and skills through their geography education during their primary school education:

• basic knowledge of the ecological, economic, social and cultural dimensions of sustainable development,
• skills and methods for evaluating and analysing changes in natural, built and social environments,
• an understanding of sustainable ways of living and of environmentally friendly and ecologically effective production,
• the skill and willingness to work for sustainable development in their everyday lives,
• the skill to participate in the planning of their own environment,
• the capacity to develop an aesthetic response to the environment, and

• the ability to act with conviction in questions affecting the surrounding world and to adopt the role of world citizens working on behalf of sustainable development and for a better future at the local, regional and international levels (Houtsonen, 2004: 147).

Since children are educated under the guidance of teachers, teachers need to gain the necessary tools and skills for coping with the demands of the 'unsustainable world'. Then, today, as in any other countries, Turkish teacher education and more specifically Turkish primary teacher education have to face the challenges of our times in terms of SD. However, although there has been a growing interest and, in turn, body of knowledge being created on SD from the view of different disciplines and particularly from the view of geography, it is not a well-known issue and concept in Turkish context. The same idea could also be applied to geography education in Turkey because there has been quite little recognition and literature available in geography tradition of Turkey in terms of SD. Based on this assumption, this paper addresses the opinions of primary student teachers on SD and ESD. In an attempt to have picture of their current understanding of SD and to describe their ideas concerning ESD, it seeks to provide answers to the following fundamental questions: (1) How much do primary student teachers know about SD? (2) What are their attitudes towards the SD? (3) What kind education student teachers have gone through in terms of SD during their pre-service education? In this respect, this is a descriptive study that aims to depict current situation and, in turn, provide a base for further research in Turkish context.

2. Methodology

The answers for above questions are sought through a semi-structured questionnaire conducted with primary student teachers in March 2007. When designing the questionnaire, we used some questions from DEFRA (2002)'s pupils and teachers questionnaire. The purpose of the questionnaire was to raise an understanding about student teachers' perceptions of the SD, their opinions regarding the issues related to SD and their learning experiences of pre-service programmes in relation to the SD. Although SPSS software was used to analyse the data, we did not look at statistical and cross tabular relationships. In this respect the analysis is largely carried out qualitatively. The sample of the research is composed of 165 third-year student teachers that completed all their geography modules by the time of data collection at Erciyes University and Uludag University in Turkey. Within the targeted group 62,4 % (f=103) of respondents were female and 37,6 % (f=62) were male. In two universities the researchers themselves handed out questionnaires and also talked about the research and the questionnaire. The researchers were also present at the time of questionnaires was being responded to clarify any further misunderstandings and for further instructions. The questionnaire allowed us to collect a structured/systematic set of data quickly and it gave us an opportunity to identify general tendencies and some specific issues with regard to SD and ESD in terms of this paper's focus. The questionnaire was composed of two sections, each section assessing a particular aspect of the research as will be stated below.

3. Findings

3.1. Student teachers perceptions of and attitudes towards SD

As discussed above being aware of the issues related to SD is very important for all citizens and so should be of great concern to primary school teachers. The first section of the questionnaire, therefore, investigates student teachers' perceptions of and attitudes towards SD. In this respect, by the first question we tried to see if respondents had heard of the term SD before. The result was interesting because 18,2% (f=30) student teachers stated that they had never heard of the term SD before. When we add 4,2% (f=7) of respondents who claimed not

to know about the question, in total 22,4% (f=37) of student teachers seems to be unaware of the concept. These figures imply that a considerable number of student teachers have not had any first-hand experience/opportunity to learn about and work on SD.

Then in the questionnaire, student teachers are asked to define SD as they perceive. The majority of respondents (44,2%, f=73) perceive the concept literally which means that they consider the concept as 'a long term development'. Put differently, they define SD as the development process that maintained within the context of long term planning. In such perception lacks the environmental dimension of SD as will be seen in the following quotations:

> 'SD means that development should be maintained, so need be thought as a long term process not a short term process.' (Respondent 153).
> 'SD means development process carried out in the context long term planning.' (R88)
> 'SD means continuous development and being aware of the need for development. It is about working harder to have better life conditions and finding lasting resources.' (R35).

The next most recognised SD definition by 21,8% (f=36) student teachers compromise effective use of natural and energy resources:

> 'With SD, I understand effective and sustained use of energy resources. All development projects should be planned on this basis.' (R3).
> 'It is about using energy resources effectively, as they are becoming short in the world.' (R122).

Although relatively small, a number of student teachers (10,3%, f= 17) have brought both dimensions of the SD together as seen below:

> 'It is about the development of country but in the meanwhile managing the natural resources for the use of next generations.' (R70).
> 'It is about living in harmony with the nature while maintaining development and having a conscious for preserving the nature for a better future. This concept emerged out as people started to live as if world resources will support us forever' (R92).

The next, f= 17 (10,3%) student teachers consider the concept of SD in the context of environmental consciousness and living in a better world:

> 'With this concept, the first thing comes to my mind is environmental consciousness…' (R68)
> 'It is about countries having continuing environmental policies.' (R51)
> 'It is an attempt of people to live in a better world.' (R48)

Then, there are f=9 (5,4%) student teachers who consider SD in the context of renewable and alternative energy sources as well as recycling:

> 'It is about using such renewable energy sources as solar and wind power.' (R109)
> 'It is about using wind power and solar energy instead of nuclear energy.' (R49)
> 'It is about achieving development without consuming natural resources but through the use of recycled resources.' (R103)

Finally, there are some definitions that clearly indicate a misperception regarding SD as illustrated below:

> 'It is achieving progression by eliminating negative factors (environment, economic, social) in front of people.' (R96).
> 'I remember hearing it in the module of Environment Science but I cannot define it clearly.' (R94).
> 'It is the development that achieved by using natural resources.' (R157).

Above findings clearly indicate that even those who stated to be had heard of the concept of SD is not aware of actually what the SD means. Only 17 (10,3%) student teachers provided a sound definition of SD and such situation implies a pessimistic picture with regard to the concept of SD in Turkish context. The next, within the first section of questionnaire, student teachers are asked about their ideas on some statements to find out about their attitudes towards some issues related to SD. Below table shows the percentages and frequencies of the responses to the each statement.

Table 1. Student teachers' attitudes towards some issues related to SD

	Agree		Disagree		Don't know	
	f	%	f	%	f	%
1-There is very little someone like me can do to protect my local environment	13	7,9	149	90,3	3	1,8
2- There is very little someone like me can do to protect the global environment	35	21,2	117	70,9	13	7,9
3- Economic growth and increased employment are more important than protecting the environment	15	9,1	141	85,5	9	5,5
4- It is developed countries that caused environmental problems so they should do something about it	104	63,0	54	32,7	7	4,2
5- What other countries do to improve or destroy the environment is none of our business	1	0,6	163	98,8	1	0,6
6-There is little connection between the protection of the environment and people's quality of life	15	9,1	138	83,6	12	7,3
7- People should be prepared to make sacrifices to improve the quality of life for others	121	73,3	29	17,6	15	9,1
8- Everyone should look after themselves rather than rely on the government for help	153	92,7	9	5,5	3	1,8
9- What is done in this country has very small effect on the quality of life of people living in other countries	20	12,1	129	78,2	16	9,7
10- Since underdevelopment is one country's own problem, the Third world should deal with its own problems and not look to the world for help	67	40,6	90	54,5	8	4,8

As seen from the table, the responses to statement 3 and 6 show an environmental consciousness from the part of student teachers. In this respect, the majority associates environmental quality directly to their life quality, so the former should not be sacrificed even for the economic growth and increased employment. Furthermore, student teachers generally have an attitude that takes a personal responsibility for the protection of environment. This is clearly seen in the responses to statements 1, 2, 7 and 8. But it should be noted that the number of respondents who feel personally responsible for protecting local environment is more than those who feel in the same way for the global scale. This situation might imply a lack of geographic understanding on the part of some student teachers because geography helps people to understand a phenomenon through different scales from local to global. On this account, the effects of a phenomenon happening at one scale are usually seen at other scales. This idea is even truer now than it was before because of globalisation. Today due to telecommunication opportunities and increased social and cultural interactions between peoples of the world, local places (and people) have increasing potentials to affect wider places. However, such interaction between countries seems to be well understood by student teachers

because the majority of respondents disagreed with statement 5 and 9 by 98,8% and 78,2% respectively.

The most interestingly, the responses to statement 4 and 10 imply a rather different picture than so far depicted. 63,0% of the respondents believe that 'since the developed countries caused environmental problems, they should do something about it'. Similarly reasonable number of student teachers by 40,6% think that 'the Third World should deal with its own problems and not look to the world for help'. The responses to these two statements strongly indicate some student teachers lack of thinking in the context of global responsibility, citizenship, and in turn geographic understanding. Although the majority has a strong personal and local responsibility concerning the issues related SD, it appears that many do not have a global perspective. Similarly the response to statement 10 also indicates that many student teachers do not tend to make any links between underdevelopment and global economic flows.

3.2. Student teachers' pre-service experiences with regard to SD and their perceptions on teaching SD

The second section reveals student teachers' experiences of pre-service education in terms of SD. Since the syllabus of elementary teacher education programmes are prepared by the Higher Education Council in Turkey, they are the same across all universities. In this respect two universities are thought to be sufficient in terms of evaluating the syllabus's impact on student teachers perceptions on SD. In the questionnaire the respondents are asked to state whether following four issues that are considered to be related to SD are covered during their pre-service education. The respondents were asked to tick all that apply. The results are as follows: Environmental issues 92,1% (f=152), global development 57,6% (f=95), social equity 50,9% (f=84) and economic prosperity 33,3% (f=55).

Within the same question, the respondents are also asked to state in which modules these issues are covered. With few exceptions, almost all respondents stated that these issues are covered in various geography modules (namely, Introduction to Geography, World Geography, Human Geography, and Turkey's Geography) and Environmental Science module. Therefore, these findings also shed a light on what student teachers learned in the geography modules with regard to SD. Although the overwhelming majority by 92,1% state that they are taught about environmental issues, the situation seems not to be the same with other issues. These findings suggest that there are no strong links constituted between environmental issues and socio-economic issues which indicate the lack of education for sustainable development. Indeed, this assumption is reinforced with the analysis of another question that asked the respondents to state whether or not they remember covering the issues that are listed in lessons at any point in their university education so far. The following table shows the listed issues and the answers of student teachers.

Table 2. SD issues that covered in pre-service education of student teachers

	Yes		No		Don't know	
	f	%	f	%	f	%
1-The causes and effects of pollution	158	95,8	5	3,0	2	1,2
2-The reduction, re-use or recycling of waste	139	84,2	19	11,5	7	4,2

3- The sustainable use of natural resources (for example fossil fuels or minerals such as aluminium)	111	67,3	34	20,6	20	12,1
4- Sustainable food production (for example: organic farming, the effects of over-fishing or intensive farming)	120	72,7	30	18,2	15	9,1
5- The relation between growth of the global economy and its impact on the environment	98	59,4	42	25,5	25	15,2
6- Global economic issues such as Third World Debt or Trade Issues (global development issues)	36	21,8	97	58,8	32	19,4
7- The conservation of wildlife habitats	124	75,2	30	18,2	11	6,7
8- Economic growth within this country- such as the importance of a strong economy in providing jobs and prosperity	104	63,0	45	27,3	16	9,7
9- Exploring the issue of poverty in the developing world	45	27,3	102	61,8	18	10,9
10- Social equity	100	60,6	52	31,5	13	7,9

The responses to this question similarly reveal how the aims of the modules that might be related to SD are perceived by student teachers. As seen from above table, according to more than 70% respondents such statements as 1, 2, 4, 7 that are directly related to the environmental issues and in this respect, could be considered in a more technical sense are delivered to student teachers during their pre-service education. Such high support rate relatively decreases to around 60% when the issue is concerned with economic and social dimensions (statement 5, 8 and 10). However, the most interestingly, such issues as poverty and global development (statement 6 and 9) that have a very strong socio-economic dimension had very low support 21,8% and 27,3% respectively. Overall these findings indicate that student teachers have not gone through such a SD education that is described in this paper during their education at the university.

To further confirm this assumption, the respondents are asked in the questionnaire the following question: 'What barriers, if any, do you think there would be to teaching sustainable development in your university? In addition to revealing the possible barriers for SD education, the answers to this question would also show us student teachers' conviction whether they have already been having an education on SD. The findings of this questions is as follows: Lack of interest/support 75,2% (f=124), lack of expertise 67,3% (f=111), no policy pressure 54,4% (f=90), lack of resources 41,2% (f=68) and time 21,8% (f=36). As clearly seen the student teachers believe that their education lacks concerning SD and the biggest barrier for this considered to be the 'lack of interest/support' regarding SD by 75,2%. This is followed by the 'lack of expertise' (67,3%) and 'no policy pressure' (54,4%). These findings strongly suggest that there are no provisions such as curricula, expert lecturers and policy requirements currently made available to student teachers with regards to their learning of SD.

Finally student teachers are asked to state their opinions on teaching SD in their pre-service education and primary schools. Particular issues are raised in the questionnaire and the responses to them are stated in below table.

Table 3. Student teachers perceptions on teaching SD

	Agree		Disagree		Don't know	
	f	%	f	%	f	%
1- It is important to teach primary student teachers about non-statutory subjects such as sustainable development.	142	86,1	15	9,1	8	4,8
2- Sustainable development education would need to be a statutory part of the curriculum in primary teacher education programmes.	101	61,2	39	23,6	25	15,2
3- Primary school pupils need to be made aware of SD	146	88,5	8	4,8	11	6,7
4- Sustainable Development Education needs to be a subject in its own right in primary school curriculum.	79	47,9	39	23,6	47	28,5

As seen from the above findings, the overwhelming majority of student teachers are in favour of SD being taught as a non-statutory subject both during their education and in the primary schools. However, such high support decreases reasonably when asked whether ESD should be a statutory part of the curriculum in both primary teacher education programmes and primary school curriculum. It should be noted that the very same respondents disagree with SD being a statutory part in both university and primary schools. The reason for why statement 2 is supported more than statement 4 seems to lie in those respondents (by 28,5%) who are not sure whether this should be a statutory part in primary school education. Because of the limits of data collection technique that is used in this study, we do not have an answer for this. This issue needs to be further investigated by using qualitative methods.

4. Concluding remarks

It appears that many student teachers who took part in this research maintain a personal commitment and have personal consciousness with regard to environmental issues but not with sustainable development. The level of knowledge on SD is not satisfactory and that significant knowledge gaps exist. In fact, SD as a concept is not known by many student teachers. They usually associate the issue with the long-term development planning and consider the concept as maintained (continuous) development. Or it is only thought by many to be in the context of effective use of natural and energy resources. In this respect, it is usually associated with either development or environmental issues only, so without making any connections between the two. Yet SD needs to consider the diverse needs of people for today and the future by bringing development issues into harmony with environmental concerns. Furthermore, even when development is stressed, student teachers do not constitute any links with social development, in particular with poverty, social inclusion, well being and equal opportunities. In such conceptualisation also lacks a consideration with respect to life styles. Since SD is thought to be a technical issue and therefore should be dealt with through necessary planning (e.g. the use of natural and energy resources) few student teachers mentioned a need for a change in their life styles or stressed social dimension of SD. In this respect, student teachers seem not to recognise SD as having far-reaching implications and, therefore, as a strategically important sphere in planning a sustainable future for us in the planet Earth.

Moreover, although student teachers usually have a positive personal attitude towards the issues related to SD in the context of local and national scale, some do not show the same

attitude when it comes to global social issues such as poverty and underdevelopment. In this respect, it could be argued that some student teachers do not clearly show having one of the basic notions of geography which is the perspective of 'from local to global'. As mentioned earlier, places and societies are linked to each other in various ways and the boundaries between different societies and places are fuzzier than ever before. In such a world global responsibility and citizenship should be considered as key means to achieve a sustained world. In this respect, geography classes should make student teachers realise that geography is not only some details of a place (its climate, physical patterns etc.) to be read by them but also something about their own life, those of others and their interactions with each other on the planet. This could be achieved through creating 'a global sense of place' in student teachers by showing them how their locality is linked to other places in the world through interactions between local and global issues and creating a global vision, spaceship Earth. This is to give people the perspective that we are all human beings, and we all depend on the same planet therefore 'acknowledging our responsibilities both to each other and to the Earth itself' (Oxfam, 2005; Internet). Yet it extends beyond this:

> [SD] is about understanding the need to tackle injustice and inequality, and having the desire and ability to work actively to do so. It is about valuing the Earth as precious and unique, and safeguarding the future for those coming after us. [SD] is a way of thinking and behaving. It is an outlook on life, a belief that we can make a difference (Adopted from the definition of Global Citizenship on Oxfam's web page).

Furthermore, according to the student teachers responses, they are exposed to the issues related to SD in usually geography modules. The only exception of this is the module of Environmental Science but it is also directly related to geography. Indeed, geography could be considered as ESD's natural home, but it seems that SD is not effectively integrated into those geography modules that student teachers have gone through. In this respect, the coverage of SD in both universities is usually quite superficial with primarily focusing on environmental aspects and usually without any references to socio-economic aspects of SD. Therefore there seems to be a need for holistic ESD that incorporates three dimensions of SD in geography modules. In this respect, ESD should not be omitted or skipped over quickly because the issue of SD has a vital importance in the lives of all people. Such education will widen the students' views and understanding of the world encouraging them having a direct contact with environmental, social and economic developments which will affect their lives dramatically. This is to teach them to take responsibility and control of their own lives and the society they are in, to give the knowledge of what it means to live along with others, and the wisdom to see the choices they make as individuals and professional will eventually have an impact on the whole community. In this respect, a key concern for the programmes of primary teacher education should be to enhance the student teachers' understanding of SD and about how best to support their future pupils learning of SD and thus help them in achieving a sustainable life.

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Subjective Theories As A Basis Of Professional Development: How Far Is ESD Included?

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Abstract

The 'disaster' of PISA has inspired a debate about the education at schools in Germany. In this context the German Association of Geography (DGfG, 2006) has published national standards of geography education. The overall aim of this paper is to outline the contribution of the subject Geography to general education. In this connection the subject is especially indebted to an education for sustainable development. Apart from the discussion about school education the universities and teacher training colleges are currently in a process of creating new study paths in line with the reorganization to Bachelor and Master degrees. Usually these curricular standards should contain on a higher level all the subject matters which are also relevant in school education, among them geographical knowledge and skills. Furthermore future teachers have to develop a professional identity, in this case as Geography teachers. Therefore professional development should regard the reflections of future teachers about their subject. What do they think about the value of geographical education at schools? Which subjective theories will guide them in their profession as Geography teachers? How far do their subjective theories include geographical views on education for sustainable development? To answer these questions or rather to determine subjective theories students first took part in an interview. In a second session they visualized their thoughts in a concept map. This article presents some first findings of the survey which can be used as a basis or substructure of professional development in Geography.

Keywords: Subjective Theories, Curricular Standards, Professional Identity, Value Of Geographical Education, Professional Development

1. Introduction

Sustainable development in Geography means having two aspects of education in mind. First of all it is necessary to have a look at the subject Geography at school. How far is an education for sustainable development realised in the curriculum? To answer this question this article focuses on the national standards of Geography. Secondly the teacher education is an important part concerning "educating for a more sustainable future" (UNESCO, 2005, p. 11). Since institutions of teacher education have the potential to bring changes within educational systems (see ibid.) the article describes a concept, which serves as a basis to go forward in this direction.

2. Sustainable Development in the National Standards for Geography

2.1 Geography's contribution to General Education in the National Educational Standards

In July 2006 the DGfG edited national educational standards in Geography for the Intermediate School Certificate (DGfG, 2006, English version DGFG 2007). In this paper the standards are presented in three sections (see Ringel, 2005, p. 26):

The first chapter outlines the contribution to general education and the overall objectives and central ideas of the school subject Geography. The second chapter describes a competence model through the determination of areas of competence and central competences in these areas. In the third and most extensive chapter general standards are fixed to the central competences in the areas of competence. These standards should be reached in the Intermediate School Certificate. Contemporary a working group develops exemplary tasks as an illustration for the evaluation on which level students have reached a standard.

As to Geography's contribution to education the very special potential of Geography lies in the combination of natural science and social science education which make "adaptation of previous behaviour and strategies on the basis of sound knowledge, judgement and problem solving competence" (DGfG, 2007, S. 5) possible. The examination of the interrelations between nature and society in different sizes and types of space is the special contribution of school Geography to an understanding of the world. Four different perspectives concerning the examination of spaces are emphasised: as concrete, material spaces, as thematically/systematically ordered spaces, as individually perceived spaces or as socially constructed spaces (see also Wardenga, 2002). Because of these overall aspects two main goals are described, among other things in accordance to the IGU's "International Charter on Geographical Education": 1. to provide insight into the connections between natural conditions and social activities in different parts of the world and 2. to teach an associated spatially-oriented competence that can be applied (see DGfG, 2007, p. 5f.). As to sustainable development the first goal is the basis and the second goal is the overall objective of education in this sense. Geography makes a significant contribution to interdisciplinary and co-operative tasks in education, e. g. environmental education and education in development policy and intercultural learning. Because of its contents and objectives geography is particularly committed to education for sustainable development.

2.2 Reflections about the Areas of Competence

The following table shows the areas of competence and their central competences (see DGfG, 2007, p. 9; the right column shows the number of standards for the central competences).

Tab. 1: Areas of competence and central competences of school Geography

areas of competence	central competences	number
1 Knowledge specific to the subject	Ability to understand spaces at different scales as physical and human geographical systems and to analyse the interrelations between man and environment.	25
2 Spatial orientation	Ability to orientate oneself in space (topographical orientation skills, map-reading competence, orientation in real spaces and reflection upon spatial perceptions).	16
3 Gathering information/ methods	Ability to collect and evaluate geographically/geoscientifically relevant information in real space and in media, as well as to describe the steps in the gathering of information in geography.	11
4 Communication	Ability to understand geographical information, to express and present it and to discuss it appropriately with others.	6

5 Evaluation	Ability to evaluate spatial information and problems, information in the media and geographical insights in terms of specific criteria and in the context of existing values.	8
6 Action	Ability and willingness to act in accordance with natural and social conditions in various fields of action.	11
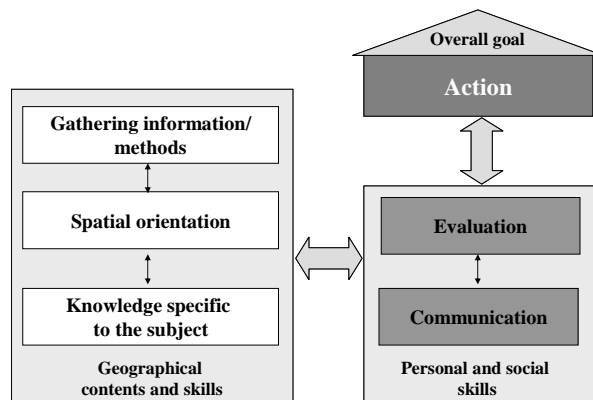
Fig. 1: Areas of competence (diagram: C. Meyer)

For a better understanding it could be helpful to reflect about these areas of competence. First of all it is remarkable that they can be separated into more or less specific geographical competences and cooperative competences. Secondly it can be stated that the first area of competence is according to the first main goal of school Geography, and the last area is according to the second main goal (see 2.1).

In this regard it is worth mentioning that these areas respectively goals are of outmost different quality. On the one hand there are cognitive and intellectual abilities, on the other hand there is an education concerning attitudes, personality and identity, which finally leads to situation adapted behaviour, respectively action. Due to the number of standards the cognitive competences and geographical skills seem to be more weightily than the personal and social skills. Last but not least it had to be asked, how far it is possible to reach and evaluate the central competences and standards which are proclaimed for the last area of competence "action" (see DGfG, 2007, p. 24 et sqq.).

3. Sustainable Development in a Subjective Theory about the Value of Geographical Education

The national standards are helpful as an orientation for teacher education, especially in order to address sustainability in geographical education. However, it has to be admitted that these standards act particularly as an instrument on a political level concerning the image of the subject Geography. In case of teacher education the internal effect on a subjective level is also very important. Therefore it is necessary to tie up to the subjective theories of teachers-to-be about the value of geographical education. This so-called sandwich-principle means that you have to link personal experiences with scientific thinking. Otherwise a fruitful learning process could not be initiated (see Wahl, 2006, p. 31).

What do teachers-to-be think about the value of geographical education at schools? Which subjective theories will guide them in their profession as Geography teachers? How far do their subjective theories include geographical views on education for sustainable development? To answer these questions or rather to determine subjective theories students first took part in an interview. In a second session they visualized their thoughts in a concept map.

Since my studies are work in progress it is not possible to give an overview about central results. From there I want to present and analyse as an exemplary finding one subjective theory from which as a synopsis only the concept map will be described.

3.1 Geographical Education as a means to Guide Students to Make Enquiries

The presented concept map was developed by a male student from the University of Trier. He was 23 years old and in the sixth semester of his studies to become a teacher at grammar schools in the subjects Geography and English.

In his concept map (see fig. 2) three columns are obvious: in the central column he describes fundamental aspects of education which are connected with Geography as a broad diversified subject. The main goal in this context is to sensitize students to problems with the cause to prepare them for their future life. An important precondition to reach this goal is a general understanding of (geographical) aspects and processes which is more important than learning and memorizing only facts. This precondition is connected with soft skills like working in groups and verbalizing problems as a contribution to communication. Because of its broad diversification Geography is predicated of bridging to other subjects. As a conclusion it can be stated that these central aspects contribute to attitudes referring to general education.

The left column is more or less personal but the interviewed student also emphasises the interdependencies between the students and the teacher respectively the relations within them. The leading question is: What function has the teacher to make the aspects of the central column clear to the students and how could this happen effectively? The main goal in this context is to guide the students to ask questions and to suggest and instruct them to make enquiries. A basis and also a goal of learning are engagement and motivation to act in this way. Since engagement and motivation are linked up with the contents in Geography the interviewed student had the idea to connect this column with the right column so that the concept map is transformed into a form of a top hat or a cylinder. Furthermore it is necessary that the students do not only talk about things in a cognitive way but also have empathy to set up understanding in an affective way. Therefore this part on the other hand is linked with the understanding and the sensitising for problems in the central column. To reach these goals it is important that the teacher stimulates comprehension and that he accepts and supports freedom in thinking as a fundamental precondition and characteristic of learning processes. These aspects lead to more self-confidence and otherwise self-confidence is a precondition for making enquiries. For the interviewed student the subjective attitudes have the highest priority in case of the value of geographical education.

The right column refers to the contents in Geography which can be divided in physical and human topics. About the interdependencies between the physical and human aspects the students become aware of the activities of the earth and the life and acting of mankind on it. This kind of awareness is connected with the understanding that people have an impact on the environment, and with the prediction what the future could look like.

Figure 2: Concept map of a male student about the value of geographical education
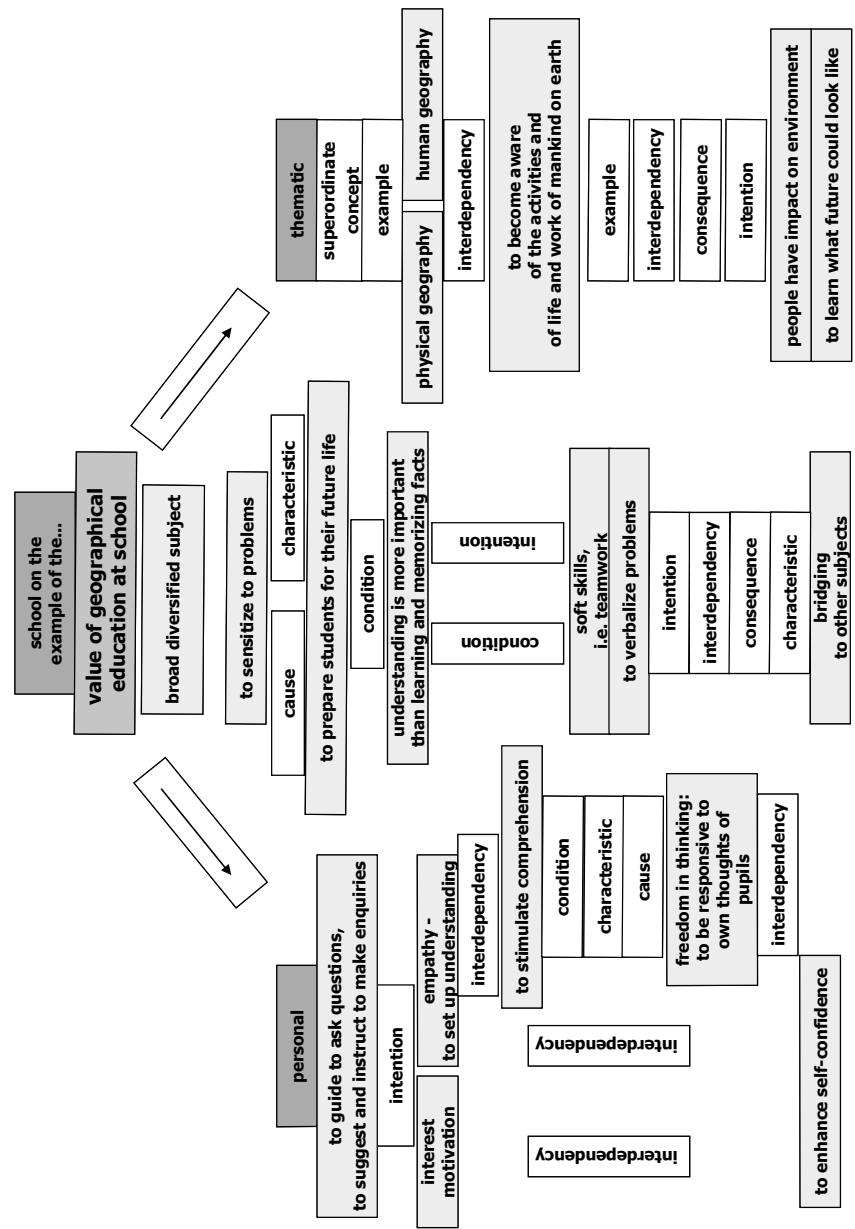
3.2 Analysis of Sustainable Development in the Concept Map in Comparison to National Standards

Sustainable development is noted in the concept map in different ways: first of all it is mentioned on a predominant cognitive level in the right column of the concept map. This corresponds with the first main goal proclaimed in the national standards. The second kind of sustainable development is an affective objective by sensitizing the students to problems in order to prepare them for their future life. This is more or less similar to the second main goal of the national standards. But the difference is, that this is only one important part of the basis to act in an associated spatially-oriented and self-responsible way. In terms of evaluating standards these objectives seem to be more realistic.

The third aspect concerning sustainable development is personal and refers to interactions, which are described in the left column. Teachers have to guide the students in asking questions and in making enquiries. This is only possible in a learning environment which respects the interests of the students and their freedom in thinking. Furthermore in this way empathy in connection with comprehension is very important for sustainable development, which leads to self-confidence as a basis for self-responsibility. Unfortunately this personal development is only marginally mentioned in the national standards of Geography although the Ministry for Education and Research (BMBF) emphasises the education of personality traits as a basis for lifelong learning and personal development (see Klieme, 2003, p. 11f.). Hence, education is a personal development process which leads to commitment and identity (see also Shulman 2002).

4. Conclusion

Subjective theories are an important basis of the professional development in order to tie up personal views with scientific thinking. Furthermore these subjective theories will guide the students in their actions as teachers in future. To address sustainability in teacher education the teachers-to-be have to think about the value of geographical education on a philosophical level.

The presented concept map in this article shows on this high level different components of sustainable development in geographical education which are capable for development in future. Therefore it could be resumed that this student is on the right way to address sustainability as a teacher. The comparison of this concept map with the national standards which serve as a global orientation shows that it is necessary to differentiate in a clear way which competences can be reached and evaluated at school and also in case of teacher education and which competences are objectives on a higher level which are still necessary to give an orientation for the future life.

In my studies I could observe that the interviewed students worked very seriously to construct a concept map which represents relatively clear their attitudes with regard to the value of geographical education. Every teacher has his own vision and philosophy of the school subject he will be teaching in future, based on his personal experiences and cognitions. Therefore it is helpful and necessary for the personal development respectively the development of a professional identity of teachers-to-be to carry out this philosophy and to connect it with other views. This should lead to a self-confident preparation of teaching profession in Geography.

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"Island Pictures" And "Situation Representations" – Children's Everyday Perceptions As A Challenge For Teaching Primary Geography In The 21st Century

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Abstract

What do primary school children think about the world? Do they know the world at all? Talking about "sustainable development" in primary school education should lead us to several questions concerning the perceptions and competencies of children.

Why do some draw the world as an "island picture" or a "situation representation" while others are able to draw a detailed world map with numerous geographical information? Can primary school children understand the structure of the wide world without having direct and real experiences? By which age will it make sense to talk about foreign countries and the world in school? How can we enable children to have a more accurate and durable frame of reference for developing store of location. How can we enable them to understand the meaning of "sustainable development".

The requirements for a Primary Geography Model for the 21st Century presented in this paper are based on the results of an actual study on children perceptions about the world. The paper discusses the implications of a global dimension into the learning and teaching of Primary School Geography for the creation of a learning environment, which supports the sustainable development of children's spatial representation and perception.

Keywords: Sustainable development, Geography Teaching, Primary School, Maps, World, Mind Maps, Perceptions, Initial Situation

1. Sustainable Development

While searching for "sustainable development" in search engines of the World Wide Web one will find a high number of pages related to this topic: 46.600.000 results were found by Google, 19.600.000 by Yahoo and 12.666.611 by MSN search – and we could find much more sites. This is an indicator for the fact that "sustainable development" seems to be a major issue in our time. Everybody is talking about it, everybody seems to be concerned of it. But what does "sustainable development" really mean? And how is it implemented into German primary school geography curricula?

1.1 Definitions of Sustainable Development

Referring to the Organisation of Economic Co-Operation and Development (OECD) sustainable development means:

"A development path along which the maximisation of human well-being for today's generations does not lead to declines in future well-being." (http://www.oecd.org/lossary/ ,3414,en_649_37425_1970394_1_1_1_37425,00.html#1970340 [2007-07-01]

This very general definition has been modified for different aims. It would be too long to mention the various definitions which can be found all around the world. But it is an interest-

ing fact that nearly everywhere sustainable development can be found in declarations in order to go with the time:

"Sustainable development is a deep-seated value of the European Union and encompasses issues of great importance to citizens, whether it be maintaining and increasing long-term prosperity, addressing climate change or working towards a safe, healthy and socially inclusive society. As we face increasingly rapid global changes, from the melting of the icecaps to growing energy demand and higher prices, the need to address unsustainable trends and change our behaviour and attitudes is more pressing than ever.

The EU's Sustainable Development Strategy aims at bringing about a high level of environmental protection, social equity and cohesion, economic prosperity and active promotion of sustainable development worldwide. There are multiple inter linkages between the key challenges: for example between the use of renewable energy and climate change or climate change and poverty. The problems are interlinked and solutions must take this into account."
(http://ec.europa.eu/sustainable/welcome/idea_en.htm [2007-07-01])

An interpretation of both definitions gives the opportunity to point out that – even if a major focus is laid on natural resources and climate change – not only these aspects are important for sustainability. On the contrary, the definition of the EU is clearly focussing on social aspects, too. The linkage between natural and human environments is very important and should not be disregarded.

1.2 Sustainable Development in German primary school curricula for Geography

In Germany, like in many other European countries, the implementation of a so called global dimension in schools nearly only takes place in secondary school levels.

A first step into a wider dimension of thinking has been done in 1990, when the Kultusministerkonferenz (KMK), i.e. the National Conference of the Ministers of Education of all German federal states (in German: Bundesländer), decided that Europe has to be considered as an important topic in School (cp. Sekretariat der Ständigen Konferenz der Kultusminister der Länder in der Bundesrepublik Deutschland 1990).

Nevertheless, despite this milestone and the remarks of the Society for Didactics in General Studies (in German: Gesellschaft für die Didaktik des Sachunterrichts) in their "Perspective Framework Social Studies", space-oriented learning still is mainly related to the homeland of the children.

Considering different curricula in Germany, Rütz determines that in homeland-related curricula like e.g. Baden-Württemberg, Bavaria, Saxony, Schleswig-Holstein or Thuringia, apart from the own federal state the rest of the world or Europe is not at all taken into account. In these federal states discovering and exploiting areas and geographical forms of appearance, as well as exposure to maps and plans is only realised by reference to the homeland or rather to the particular federal state. In other federal states, Germany, Europe or even the world are not mentioned at all (cp. Rütz 2005, p. 37).[1]

In spite of a new orientation, also in cognitive psychology since the 1980s, Piaget's levels of development can still be found in various curricula. More recently research results show that altering knowledge implicates integrating knowledge into existing structures (cp. Carey 1985 and Vosniadou 1994). Furthermore topical research documents that neither perceptions nor

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[1] In many more European countries the situation is similar. In Switzerland geographical aspects are referred to the particular canton (cp. Council of education of the canton Basel-city 1991). Considering the national curriculum of Great Britain, topics in Key Stage 1 are for example the city or village where the school is and either a place in the United Kingdom or a place overseas that builds a contrast in physical and/ or human geography (cp. Department for Education and Employment & Qualifications and Curriculum Authority 1999, p. 18-20). This place does not necessarily have to be integrated into a global idea.

pre-experiences of children end at their garden fences (cp. Schmeinck 2006, 2007a and 2007b). Hence, also the curricula should take this into account.

The noun "Nachhaltigkeit" (i.e. sustainability) is mentioned once in the whole actual curriculum of Baden-Württemberg (South West Germany) for "human – nature – culture"[2]. It is thereby mentioned as one aspect together with nine other examples for the conversion of the curricula in accordance to the age of the pupils (cp. Ministerium für Kultus, Jugend und Sport in Zusammenarbeit mit dem Landesinstitut für Erziehung und Unterricht Stuttgart 2004, p. 18).

In the sphere of competence number nine[3], the learner should become competent to identify by one example characteristics of sustainable development:

"9. Energy, materials, traffic routes: comparing and conscious use

The learners

- know conventional and alternative possibilities of the production of energy;
- know about the fact that natural resources are limited and that their regeneration takes time and learn to deal economically and consciously with them;
- know different possibilities of the transformation and recycling of materials and deal economically with them;
- discover waste materials in their aesthetic quality and in their usefulness in artistic contexts.

The pupils

- are able to recognize characteristics of a sustainable development: effectively, frugal, justly;
- are able to participate on the basis of a comprehensive movement training reliably in traffic;
- are able to adopt properly their knowledge and talents as cyclists in traffic reality;
- are able to develop and to present desires and fantasies about future forms of traffic, energy use and consumption of materials."
  (Ministerium für Kultus, Jugend und Sport in Zusammenarbeit mit dem Landesinstitut für Erziehung und Unterricht Stuttgart, 2004, p. 108) (original in German, translation by the author)

We may realize that sustainability and sustainable development are topics of the curricula. But even if they seem to be very important it is necessary to state that it is only one topic beneath many others.

2. "Island pictures" and "situation representations" – the initial situation of the children in primary schools

The results of an international study[4] about children's perceptions of the world show clearly that primary school pupils already possess conceptions and knowledge about foreign countries, continents and/or about the world. The mental maps of the 724 pupils show spatial

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[2] In various German federal states, geography is not an independent subject in primary school but belongs to a combination of subjects called "General Studies" (in German: Sachunterricht). Moreover in Baden-Württemberg the subject "General Studies" is combined with music and fine arts to a subject combination called "human – nature – culture" (in German: Mensch – Natur – Kultur).

[3] The curriculum for „human – nature – culture" is subdivided into nine different spheres of competences. Three of them are each assigned to one of the central topics: 'human living', 'cultural phenomena and environment' and 'nature phenomena and technology'.

[4] Within the study 724 10-year-old pupils from eight different countries (Great Britain, Sweden, Germany, Switzerland, France, Chile, Spain and the United States of America) were asked to draw a map of the world and to draw and write on their map anything they can think of with regards to the world. Beside the mental maps statements about different possible factors of influence for the existing conceptions were raised on the basis of pupils, parents and teacher questionnaires (Schmeinck 2007a).

structures, position of countries to each other, sizes, conceptions and in individual cases even the attitudes of the pupils concerning some countries.
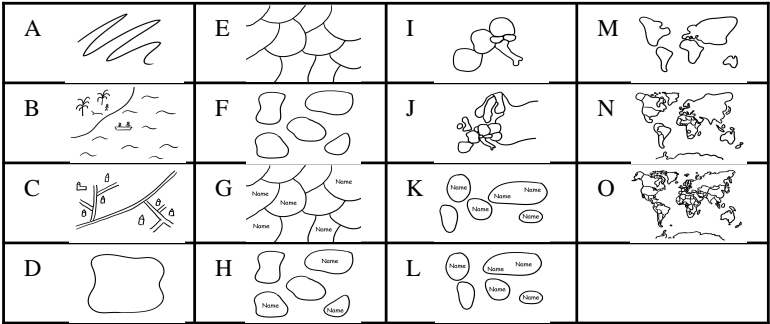
Figure 1: Categories for the maps / Source: Schmeinck 2007b, p. 37

N=380
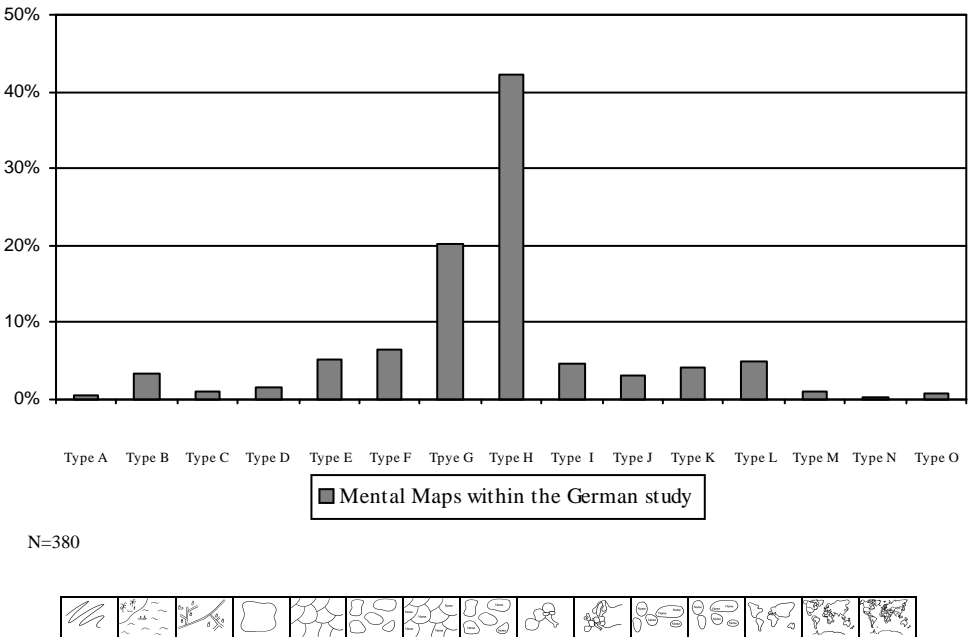
Figure 2: Distribution of the map categories within the German study /
Source: Schmeinck 2007a, p. 157 (original in German)

154
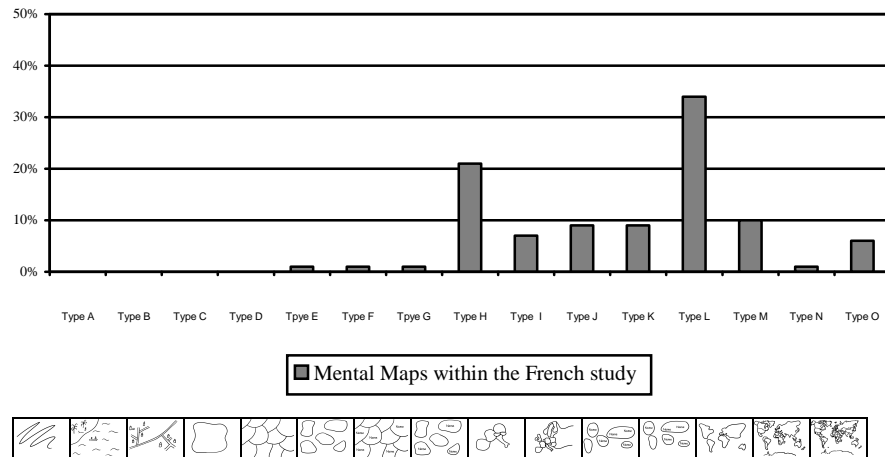
Figure 3: Distribution of the map categories within the French study /
Source: Schmeinck 2007a, p. 158 (original in German)

When analysed, 15 different map types could be identified (figure 1), showing that the development of the spatial conceptions of the pupils is not homogeneous.

Quite the contrary: despite their all being the same age band the level of development of the pupils' spatial conceptions represented a wide variety. However, as well as variations between pupils there were also significant variations between countries (figure 2 and 3).

The two figures show that the pupils of the German sample have less "good" maps than these of the French. In the last sample the quality of the maps was much higher than in Germany. This could be related to both, the fact that in France Geography is a independent discipline already in primary school and to the more frequent exposure to geographical media in French schools.

3. Developing spatial conceptions in primary school as an important factor of sustainable education

As shown in the first part of this paper (cp. chapter 1), the idea of education for sustainable development is very broad and even one aspect of the curricula for primary schools. At primary school age, children already possess a perception of the world (cp. Chapter 2). In some cases, this perception is probably due to school lessons. In most of the cases, as the presented study shows, the perception seems to be a result of a number of factors which are not connected to school.

Pupils should be enabled to have a sustainable attitude towards the world; therefore it seems necessary to start very early with an education aiming for this goal. Figure 4 shows the suggested model for a development of spatial conceptions on primary school level. The individual strands thereby represent the different areas, which are – in the context of the spiral curriculum – repeatedly taken up, extended and deepened.

Actual geographical proximity or distance cannot necessarily be equated with pupils' emotional and/or personal proximity or distance. Therefore, the organization of the areas within

155

the present model cannot be exclusively bound to the real geographical distances. The different areas are therefore defined individually in relation to the subjective experiences and conditions for learning of the children:
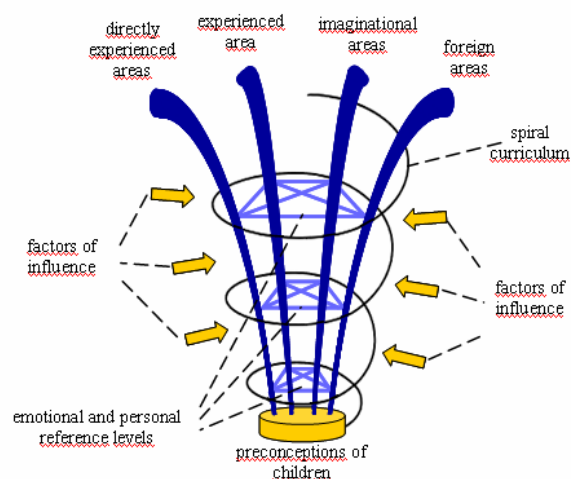
Figure 4: Model for the development of spatial conceptions in the primary school /
Source: Schmeinck 2007a, p. 237 (original in German)

- the direct experience area: the area, in which the pupils spend their everyday life
- the experienced area: the area, which the children already got acquainted with by occasional personal experiences
- the imagined area: geographic areas, of which the pupils only know by hearsay, on the basis of films or documentations or stories of other people
- the foreign area: all those geographic areas, which are unknown by the children and/or for which they only possess limited information (Schmeinck 2007a, p. 238 (original in German), see also Schmeinck 2007b).

It appears as though a constant movement between areas and perspectives at increasingly complex levels is important for the development of spatial conceptions. Teachers need to repeatedly provide experiences for pupils of the different spatial dimensions and with alternate perspectives. Furthermore, in order to enable an emotional and personal purchase between the individual strands, it is crucial that the new information connects to pupils' already well-known knowledge and/or conception structures. Learning and teaching must therefore integrate and show the relations between the taught area and the personal environment.

In connection with sustainability and sustainable development the given model can offer the pupils to develop a individual but global net of information. Starting from the preconceptions of the children the network can grow and include more and more information and cognitions. The net thereby is to be seen as a flexible livelong learning construction that allows orientation for today but also for future problems and tasks.

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Symposium Session: Intercultural Dialogue on Educational Approaches to Sustainability (IDEAS) – Project Rerort

Intercultural Dialogue On Educational Approaches To Sustainability (IDEAS) – Introduction

Dieter L. Boehn (Wuerzburg)

Abstract

This contribution is intended as an introductory report on the contributions from Germany, China, and the USA. It presents a project that has the objective of generating a model for teacher training. A further intent is to stimulate suggestions for continuing development of the project.

Even though "Sustainable Development" is not offered as a separate subject, its concepts—like those of environmental education—are included in various other subjects; consequently a separate module is to be generated to illustrate the complexity of objectives and, above all, their contextual intertwining. The intent is to convey competencies to (tomorrow's) teachers that enable them to prepare students for a world in which factors such as globalization impart a new significance to sustainable development, because the so-called "developing countries" now require resources to an increasing extent themselves.

Sustainable development links the conservatory intent of environmental education to the element of development in economics and society. Decisive criteria for successfully facing the future include not only more effective utilization of resources but primarily channeling human intelligence into innovation.

Initially topics were selected that we feel have a global significance: water, waste management, renewable resources, participation, transportation, global warming. Admittedly, there are numerous additional topics.

Despite a formally global perspective, approaches taken to date in education for sustainable development typically rely too heavily on one's own values. The perspectives of other countries must now be included. Thus specialists in Geograpic Education from Germany, the USA, and China are working together, each presenting their own perspective. Initial results indicate that there are numerous shared objectives, however great differences in implementation.

Keywords: Sustainable Development, Teacher Training, Global Development, International View, Change of Perspectives

1. The Objective: ESD in Pre-service Teacher Training

In many countries of the world, the concept of "sustainable development" is dealt with in several subjects; in the case of Geography instruction, it takes on a particularly high importance. Consequently ESD must also be incorporated into training of tomorrow's Geography teachers. An analysis performed for Germany that was based on the German National Plan of

Action (2005), UNI 21 (Federal Ministry for Research and Education, 2003), the Orientation Framework (2007), and evaluation of college/university course catalogs revealed, however, that the topic of ESD in teacher training is either only marginally covered or not at all.

It therefore appears necessary to anchor ESD in pre-service teacher training. To achieve this as efficiently as possible, we selected an international approach. This contribution presents key aspects of the overall IDEAS concept, specific content of the latter will be discussed in detail in further contributions (Hamann, Lee/Bednarz/Bednarz, Petersen, and Wang & Wei).

The stipulations of the 1992 World Summit in Rio form the starting point in each case (cf. Agenda 21). In doing this, three factors were seen as essential for sustainable development: economics, ecology, and society. Geography instruction had previously already covered major subcategories, albeit with entirely different objectives. Primarily in western industrialized countries, the focus of "Environment" content had the objective of preserving nature (cf. Kross 1992); in the case of the topic "Developing Countries", by contrast, economic growth (which is inextricably linked to environmental burdens) is assessed positively. The third topic is "Society". In Geography instruction, great importance was, to be sure, ascribed to this topic but connections between the social, economic and political conditions in the various parts of the world and the topics of the environment and development were rarely pointed out.

To better equip tomorrow's teachers for this topic and because numerous members of academia and the political realm are convinced that swift action is required, the focus of future-oriented teacher training must be directed to the topic of sustainable development.

2. ESD: The Necessity of International Cooperation

Despite the ever increasing degree of interconnection on a global scale, the scope of international cooperation in the field of education is surprisingly narrow. Lists of requirements for pre-service teacher training are issued by the respective ministries of education or universities. These lists are valid regionally and are based on the respective prevailing cultural values, even if the topics covered are of global relevance.

Why is international cooperation important? Is it not possible for a regional curriculum to more effectively consider the regional cultural and economic concerns? It would indeed be pointless to call for global curricula. What is necessary, however, is more intensive international cooperation, at least among subject-oriented education specialists, teachers, and pedagogues who stipulate the objectives and content that classroom instruction is to have. The reason for this is that we must facilitate a change of perspectives for our students. They should learn to consider a situation not only from their own point of view but also from the perspective of those who live in other regions. To do this, we must become acquainted with the arguments of others.

Fortunately members of the academic community work together. This conference is a good example: we have gathered here to exchange ideas at a meeting of the Commission on Geographical Education of the International Geographical Union. UNESCO has established an international network linking the individual National Action Committees. Cooperation is restricted to objectives and individual topics. The level of cooperation is even more limited in the field of teacher training. Because of the very fact that regional objectives and the resultant strategies for the common objective of "sustainability" are so important in the case of ESD, we are convinced that a dialog involving the various approaches and their culturally-rooted foundations is crucial.

3. IDEAS – An International Project on Teacher Training

The intent of our project "Intercultural Dialogue on Educational Approaches for Sustainability" (IDEAS) is to jointly elaborate topics and in so doing point out the diversity of objectives and methods. In particular the associated objectives are influenced by regional perspectives that are often governed by cultural factors. These efforts should enable the prospective teacher to later convey sustainable development to students in a manner that clearly illustrates differences in perspectives. The prospective teacher will then be able to bring about a change of perspectives in the classroom and thereby also convey intercultural skills. The decision to base our IDEAS project at the Georg-Eckert Institute for International Textbook Research was made chiefly because cooperation with the institute in the course of previous projects had always been very fruitful.

The IDEAS project currently involves colleagues from the USA, China, and Germany. On the one hand, we have worked together on various projects for years, on the other these three countries play a decisive role in the global environmental situation. In all three countries the cultural component plays a major role.

The USA was chosen because it is the world's leading country not only politically, but also economically and technologically. High importance is ascribed to the environment as well as to economic growth. The current administration has refused to sign the Kyoto Protocol, because it feels that the cause of climate change has not been demonstrably proven by science and above all because it fears that such a commitment would impede economic growth. In absolute terms, the USA with its some 300 million inhabitants is the country that produces the greatest environmental burden. Despite this fact, numerous initiatives have been launched at the level of individual states and cities that have the objective of achieving sustainable growth.

China was selected, because it is the country with the world's highest economic growth rate and in the year 2007 will surpass the USA as the world's leading contributor to environmental burdens. The current administration argues that China is a developing country and consequently has some catching up to do in terms of economic development. Admittedly the overall burden is very high, but on the other hand China does have 1.3 billion inhabitants, the per capita burden is therefore significantly lower than in industrialized countries. Great importance is ascribed to environmental protection, however implementation of national objectives is rather difficult to enforce at lower, regional levels. Using China as an example, the importance of efficient technologies can be readily illustrated.

Germany was selected because of its exemplary status among European Union countries in terms of the priority that it has assigned to preservation of the environment. At the same time, however, the level of economic growth in Germany demonstrates that the administration is successfully taking appropriate actions. The German administration uses tax revenue and other incentives to promote the development of sustainable forms of energy. In so doing, meaningful advances have already been made. Despite this, Germany is still making a substantial contribution to the global environmental burden, its per capita figures, for example, are much higher than those for China.

Cooperation with colleagues from Palestine has also been launched on a subtopic. We will continue our efforts and encourage new partners, including conference attendees, to join our international cooperation.

4. The IDEAS Approach

We began with an analysis of curricula, and above all school textbooks, to determine how ESD is already being conveyed today. From these data we identified topics that are relevant to the project. As the next step, we stipulated that we will (initially) restrict ourselves to the key topics that we want to research in greater detail in the individual countries. At the same time we launched development of pre-service teacher training for the topic of "sustainability".

4.1 Analysis of school conditions

4.1.1 Analysis of curricula

In all three countries involved in this research project, there are numerous curricula. "Sustainable development" is at least mentioned in nearly all of these curricula, more recent curricula also include binding topics in this field. In the following I will restrict myself to Germany, simply because more data about my own country are available to me. In most cases the topics only address the subject matter partially. For example, means of conserving energy are mentioned or ecologically-oriented agriculture is presented. Global examples are frequently selected such that the aspect of environmental burdens is more heavily emphasized than that of economic growth. Social aspects such as the will to improve people's living conditions are very often not included. Almost without exception, reference is made to the culture of the respective region, activities at that location are frequently assessed in terms of the ideology of preservation that is now prevalent in Germany.

4.1.2 Analysis of school textbooks

Aspects of sustainability are touched upon in many school textbooks. An analysis performed by our American colleagues revealed that US textbooks for Geography instruction contain well over 100 terms that at least in part pertain to sustainability. This topic is also addressed in German textbooks. Comprehensive topics involving sustainability are still uncommon. The differing social conditions and culturally-based values systems are usually not included when sustainability is covered. The focus is clearly on environmental protection. Solutions to environmental problems are offered using two strategies: a change in the behavior of citizens (e.g., using public transportation instead of a private automobile) and in the development of modern technologies (e.g., utilization of solar and wind energy).

4.2 Selection of content

4.2.1 Brainstorming: relevance of topics

Review of curricula and school textbooks did not make it possible to identify binding stipulations on topics to be covered. For this reason, we held a brainstorming session based on these reviews to collate a list of terms we consider relevant for an international dialog on ESD. These terms are listed below:

Table 1: Indicators of ESD, collated by the working group IDEAS in 2005 (Atiyha, Bednarz, Bednarz, Boehn, Henry, Petersen)

Indicators of ESD	
Bio/organic	Health (healthy life styles)
Biodiversity	Human-environment interaction
Carrying Capacity	Life styles
Climate change/global change	Limits (of growth)
Cultural sustainability (divergence/convergence)	Nature
Conservation	Pollution
Consumption patterns/quantities	Politics
Degradation	Poverty
Desertification	Population
Ecology	Preservation (e.g., in creating National Parks)
Ecological footprint	Quality of life
Economic development	Rainforest
Ecosystem	Regional economic circle
Employment	(buy locally produced goods)
Endangered species	Renewable /non renewable/flow resources/sources of
Environmental	Recycling
• Change	Responsibility
• Ethics	Security/security of food
• Impact	Simple
• Justice	Social justice
• Modeling	Stewardship
• Protection	Sustainable/sustainability
Exhaustion	Systems (feedback operations in a system)
Extinction	Values
Geographic Information Systems (to support ESD)	Waste/waste management
Gender (underrepresented populations)	Wildlife/wilderness
Green	
Greenhouse effect	

4.2.2 Selection of key topics

The next step was to reduce the number of indicators to a level that can be covered within the scope of a lecture course. The following fields of topics were taken from analyses of the discussion in society, academic literature, curricula and school textbooks as well as the international discussion conducted within the IDEAS working group.

1. Forecasts of environmental trends and their impact on one's own living space
2. Environmental protection with the objective of preserving unspoiled nature
3. Technical means of promoting sustainability
4. Renewable resources
5. The necessity of behavioral changes and possibilities for implementation
6. Participation: opportunities for each individual to get involved in measures for sustainable development (cf. Agenda 21)
7. Transportation
8. Waste management
9. Water

5. Conclusion

We are still at the onset of our development and have come here to stimulate and gather suggestions for future efforts. We must strive, particularly in pre-service teacher training, to incorporate the diversity of cultures into our approaches.

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Education For Sustainable Development: Water

Berta Hamann (Wuerzburg)

Abstract:

The IDEAS working group selected "Water" as its focal point from the complex of Environmental Protection topics listed by UNESCO as essential for sustainable development. This paper presents the German contribution.
The objective of this module is familiarization with the implications of the resource "water", the necessity of sustainable use thereof from a local to a global context and gaining an understanding of culturally-based differences in approaches. This module comprises three blocks: lecture, seminar and field-trips. The lecture conveys theoretical fundamentals of "sustainable development" and presents the results of the major conferences from Rio 1992 to Brussels 2007. Using selected topics from both within the immediate realm of direct experience gathered by students as well as from beyond, the problems associated with the resource "water" are discussed; here focus is on the different regional attitudes toward water's importance and strategies for action. In the seminar, tomorrow's teachers deal with topics presented in the lecture in a task-oriented manner that is geared to the type of school they will teach at and then elaborate units to be used in classroom instruction. Examples of the respective topics at learning sites outside of school deepen and consolidate understanding. As in the seminar, examples are investigated that lie within the environs as well beyond the realm of previous experience of the future teachers. Typical examples include local water supply and disposal, flood prevention and water storage, water as a source of conflict.
Evaluation of the seminar as well as the concept of sustainability is intended to reveal how ESD is received by pre-service teacher training students. It is anticipated that the result of this module will be a broader understanding for culturally-based differences and values pertaining to patterns of action in sustainable development, this resulting in an enhanced competency in conveying the associated content.

The concept of the IDEAS project group was presented in the contribution by Boehn (cf. Boehn in this conference proceedings). This contribution deals with implementation of the associated concept in pre-service teacher training at the University of Wuerzburg. To do this,

- the objectives are formulated, which are to be achieved using this module,
- the administrative parameters are explained,
- the educational approach is described,
- a brief report is given on the three course elements conducted, and
- the results of evaluation of the module by both the instructors as well as the participating students are presented.

1. Task Definition

To date, no independent module on ESD is available. ESD is addressed separately in the context of the most diverse topics. The most important topical fields involved are environmental education and developing countries. We, the Geography Education specialists in Wuerzburg (Dieter Boehn, Berta Hamann, Helmer Vogel) are elaborating a concept that does not integrate ESD into other topics, but rather makes ESD a focal point in the training of tomorrow's Geography teachers. Furthermore, our concept is also intended for use in in-service teacher training. The objective is ultimately to enable the teacher to convey to his students the competency to "act responsibly in the interest of sustainability".

2. The Parameters

At the onset of developing this concept, considerations focused primarily on administrative aspects. In the context of the so-called Bologna Process, the countries of western Europe have agreed to modularize their courses of study to facilitate greater mobility and thus enhance the level of internationalization of university coursework. In the case of modularization in pre-service teacher training in Bavaria, the Bavarian State Ministry of Sciences, Research and the Arts has imposed binding stipulations on how many credit points may be assigned by the individual fields of education (academic discipline, didactics in that discipline, and educational sciences). 15 credit points were allocated to Geography Education. The Arbeitsgemeinschaft Didaktik der Geographie an bayerischen Universitäten [Working Group of the Specialists in Geography Education at Bavarian Universities] has made a resolution to distribute these 15 points over three modules:

- Geography Education. Building upon theoretical fundamentals, objectives and content of future-oriented Geography instruction are defined in practical terms; consideration is given to the views widely held in society and insights gathered in the respective academic disciplines (5 credit points).
- Geography teaching methods. Practice-oriented implementation of objectives and content in Geography instruction with due consideration of recent insights gained in educational sciences and psychology (5 credit points).

This leaves 5 credit points for other courses. Geography Education at Wuerzburg uses these points for a module on ESD.

3. The Methods Concept

The test module was generated as a unit comprising three submodules: lecture, seminar, and field trip. This includes all forms of instruction that the university has to offer.

In the lecture course, tomorrow's teachers for all types of school receive the requisite academic fundamentals for teaching Geography.

The lecture course lays a foundation in terms of theoretical teaching and geographic concepts. Which topics of ESD are important for the student and why? Which scientific insights are currently known, e.g., results of research on climate change? The starting point here is an approach that is oriented toward the student, content is supplied by numerous specific academic disciplines. The focus is primarily on the firmly-based knowledge that a teacher needs to effectively convey an understanding of sustainable development.

The seminar deals with preparing the content of selected topics for classroom instruction at various grade levels. The objective of this seminar is to prepare the content presented in the lecture course for the respective types of school and grade levels involved independently. Draft lesson plans are then discussed by the group.

On the field trip, the theoretical concept of sustainability is considered in the context of conditions found in the real space students visit. The objective of the field trip is to investigate a specific topic covered in the lecture course and seminar in greater depth on location. Here research efforts should focus on how tomorrow's teachers can later guide students toward acquiring a better understanding of sustainable development of a region by having students conduct their own hands-on investigations.

4. The Module "Water"

The IDEAS project group had agreed to focus on 5 topical fields: water, population, technology, global change, and rural reform. We selected the topic "water" from this list for the planned test module. Water was deemed an ideal choice, because it is included in the curricula of all types of school and a key component of experiences in the student's everyday

world. In addition, there is an emotional relationship to water, water is regarded positively in our culture. In global terms, the availability of water to people differs very widely depending on the region—it is therefore possible to illustrate the regional differences in the significance of this topic. Finally, water can be discussed on every level of scale: local, regional, and global.

The following sections present the various levels of scale incorporated into the topics of the lecture and seminar and then investigated at the location visited during the field trip (abbreviations: L = lecture course; S = seminar; numbers indicate the respective week of summer semester 2007).

4.1 Lecture course

The *lecture course* endeavors to convey as many concrete aspects of education for sustainable development as possible that can be presented in geography instruction.
The individual topics are structured using a standard format:
- Importance of the topic for geographical education
- Scientific analysis of the problem
- Hazards caused by improper utilization of natural resources, these include, for example, political decisions and above all irresponsibly wasting resources for prestige reasons or short-term profits
- Opportunities to solve problems with innovative technology
- Necessary changes in behavior. In this case, the difficulties caused by a call to do without should be openly discussed as well.
- Where practicable, a positive look to the future.

L 1   Sustainability: delineation of the concept
L 2   Sustainability: historical development from Rio 1992 to the United Nations Report in Brussels 2007
L 3   Water as an important resource with availability that varies from region to region
L 4   Utilization of water resources over large areas (south-north water diversion in China, Aral Sea)
L 5   "Franconian Lake District": diversion from water-rich southern Bavaria to the relatively dry north
L 6   Significance of and problems associated with large dams e.g., Aswan, Atatürk, Three-Gorges
L 7   Degradation, desertification, deforestation
L 8   Water: utilization—waste—conservation (agriculture, industry, household)
L 9   Water: pollution—treatment—pollution prevention
L 10   Problems associated with drinking water supply as illustrated by the regional   example of Wuerzburg/Lower Franconia
L 11   Irrigation-based agriculture and its impact in humid, arid, and semi-arid regions
L 12   Water and tourism in the global context: global distribution, economic significance, environmental issues
L 13   Water as a factor of political power: water conflicts; privatization and market interests.

4.2 Seminar

In the *seminar* students present sample lessons. In doing so, they build upon the assumed (anticipated) interests of pupils and the importance that the topic has for pupils. [Note: S1

gives an introduction to the concept for drafting a classroom lesson including objectives, structure and requirements.]

S 1   Introduction
S 2   Agenda 21
S 3   Drinking water—an endangered resource
S 4   From the Aral Sea to the Aral Desert: irresponsible utilization of water resources
S 5   Large-scale Project "Franconian Lake District". Regulation of water and utilization thereof (cf. field trip)
S 6   Importance and problems of large dams (freely-selectable example, e.g., Three Gorges)
S 7   Desertification: causes and effects (freely-selectable example, e.g., Sahel Zone)
S 8   Water in the household. utilization—waste—conservation
S 9   Water: pollution—treatment—pollution prevention
S 10   Regional water supply in areas with limited water resources (self-selected example such as piping in from remote source)
S 11   Irrigation-based agriculture (freely-selectable example)
S 12   Vacation at the seacoast: water and recreation (freely-selectable example)
S 13   Privatization of Water Supply.

4.3 Field trip

The Franconian Lake District was selected as the field trip destination because of its relative proximity and the fact that the region is well suited for investigation of sustainability both in the context of water resource utilization and tourism.

"While the south of Bavaria has uniformly abundant water resources at its disposal, unfavorable geologic conditions and low precipitation in northern Bavaria result in limited water resources in that region. By diverting water from the Altmuehl and Danube rivers, low water flow in the rivers Rednitz, Regnitz, and Main is improved. Additionally, flooding is reduced in the middle section of the Altmuehl Valley. The Franconian Lake District has created an attractive local recreational area and tourist region" (Ansbach Water Resources Office, 2007). Furthermore, a nature protection area was established, thereby putting into practice the idea of preserving unspoiled nature.

5. Evaluation

Evaluation was performed in the seminar and involved two questionnaires. One pertained chiefly to evaluation of the seminar, the other with the concept of sustainability.

5.1 Evaluation of the seminar

25 students completed this questionnaire. Salient results are listed below:

Table 1: Evaluation of the Seminar "ESD: Water"

1. Were you already familiar with the concept of Education for Sustainable Development prior to the seminar? Yes **8** No **17**
2. The focus of this seminar was on the topic of "Water".
a) Did you think it was a good idea to focus exclusively on this topic? **21**
b) Would you prefer to have covered a broader spectrum of topics? **4**

3. What importance do you ascribe to education for sustainable development in Geography instruction? (In your assessment, compare "sustainable development" with other topical fields that have already become established in Geography instruction, for example, developing countries, the near vicinity, globalization, etc.). very high importance **7**; high importance **9**; moderate importance **9**; low importance **0**; very low importance **0**; unimportant **0**

4. "Sustainability" as an integrative concept: lecture, seminar, and field trip
a) Do you consider the integrative concept a well-rounded implementation of the topic? **22**
b) Should "sustainability" be offered as a separate course, i.e., either only as a lecture, seminar, or field trip? **3**

5. Did you sign up for this seminar because you
a) needed a seminar course? **7**
b) felt the topic was important (for your career as a teacher)? **1**
c) for both reasons **17**

This survey reveals that the students prefer to focus on a single topic and its regional differences as illustrated by examples from around the world. Even though the concept of ESD was almost entirely unfamiliar to the students before completing the module, they now consider it very important (cf. question 2 and 5).

5.2 Relevance of terms associated with "sustainability"

The 46 terms in the table below were taken from a list prepared by the IDEAS working group. Students were asked to assess the respective relevance to their classroom instruction activities.
30 students completed this questionnaire. Salient results are listed below:

As a future teacher, please rank the topics in the table below in terms of their importance for instruction in your Geography courses
■ very important (++) ■ important (+) ■ not so important (-) ■ unimportant (--)

Please mark the respective column for each topic using these symbols.

Table 2: Assessment of the Importance of Specific Aspects of ESD for Geography Instruction

	+ +	+	-	- -		+ +	+	-	- -
Biodiversity	1	18	11		Greenhouse effect	7	12	1	
Biotopes	1	14	13	2	Limits (of growth)		18	10	
Carrying capacity	6	18	6		Nature		20	1	
Climate change/global change	17	12	1		Organic farming		21	7	1
Consumption patterns/quantities	5	17	7	1	Pollution	7	13		

	+ +	+	-	- -		+ +	+	-	- -
Desertification	7	19	4		Population structure		18	4	
Ecology	3	21	6		Population trends	2	16	2	
Economic development		24	6		Poverty and the environment	1	18	1	
Ecosystems	6	18	5		Preservation (e.g., in creating National Parks)		20	4	
Endangered species	2	18	10		Quality of life		20	9	
Environmental change	7	18	5		Rainforest	0	20		
Environmental degradation	2	20	6		Recycling	4	16		
Environmental ethics	13	17			Regional economic circles (buy locally produced goods)		12	13	
Environmental ethics	7	21	2		Renewable/non-renewable/flow resources	5	5		
Environmental impact	5	22	3		Security/security of food		20	4	
Environmental justice	9	21			Simple living		11	16	
Environmental politics	5	21	4		Social justice		20	4	
Environmental protection	16	14			Stewardship		16	7	1
Environmental responsibility	17	12	1		Sustainability	6	13	1	
Exhaustion	19	11			Sustainable life styles	1	19		
Extinction of species	5	16	9		Values		17	7	1
Food miles	10	11	8	1	Waste/waste management		15	7	
Gender (underrepresented populations)	2	7	15	6	Water resources	6	14		

This questionnaire reveals that the topics covered in the lecture and seminar were ascribed the upmost importance. It can thus be concluded that the module heightened the students' awareness of the topic of "sustainability". Topics widely discussed in the public realm such as the greenhouse effect, environmental protection and recycling also appear to have a lasting impact on students and were thus assessed positively. By contrast, topics such as "simple living" and "gender" were ascribed little or no importance. Based on the assessments performed, one could speculate that for the overwhelming majority of students, "gender" is on the one hand not linked to "sustainability" and on the other not considered relevant to them personally (22 seminar participants were female) and therefore also has no significance for their own Geography instruction activities. Because this topic is explicitly mentioned in the Agenda 21, however, this assessment can be considered to have been influenced by cultural factors. In the case of the topics "simple living" and "regional economic circles", one can almost speak of polarization among students. Positive and negative responses on these topics are more or less balanced. In the case of "simple living", this can perhaps be attributed to the fact that a "sustainable life style", a topic that was without exception assessed positively, already clearly documents that person's will to act responsibly. Why, then, should one castigate oneself with "simple living"? With "regional economic circles"—frequently seen as a decisive contribution to avoidance of long transport distances—it may well be that those students who less strongly embraced this approach consider it an important aspect of their quality of life to consume products from all parts of the world.

6. Outlook

Launching the module on ESD has shown that while this topic is received with interest, students do not consider its inclusion in Geography instruction absolutely necessarily. Because we have set the objective of investigating cultural approaches in our IDEAS research project, we look forward to learning how these topics are covered in the USA and in China. The results of those investigations will surely involve interesting new insights.

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Because the present contribution is a report on a project, no other references are cited.

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The Status Of Education For Sustainable Development In The Schools: United States And South Korea

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Abstract

This study assesses and contrasts instruction in sustainable development in United States and South Korean middle (secondary) and high (tertiary) schools by evaluating teachers' knowledge of, and attitudes toward, this important topic. A questionnaire administered to teachers in both countries provides data for the study. After inquiring about their definition of sustainable development, the survey asked teachers if they taught about sustainable development, and if so, to indicate from a list which topics they covered in their instruction. The questionnaire also collected information about which topics teachers emphasized and which topics teachers thought should be included in their curricula. Variations between the two countries are evaluated and contrasted. The study compares respondents' appraisal of the importance of teaching about sustainable development versus the amount of instruction and which topics they actually include in their teaching.

Keywords: Environmental Education, Sustainable Development, Geography Education

1. Introduction

This article aims to provide a first step in understanding international differences in the teaching and conceptualization of education for sustainable development (ESD). Teachers in South Korea and the United States were surveyed to determine their definition of sustainable development (SD) and what topics they taught, emphasized, and would like to teach in their courses. Significant disparities were discovered. After describing the context and survey results for each country, the article concludes by contrasting and analyzing the differences.

Since no standardized instruments suited to the purpose of the study exist, a new questionnaire was developed. The survey instrument was first developed as part of the IDEAS project where participants from Germany, Palestine, China, and the United States created a list of key concepts related to SD. The list formed the core of a pilot survey administered to Texas teachers in December 2005. For this research, the survey was revised to include additional research questions, the list of concepts was clarified to work well in two cultural contexts, and the instrument was translated into Korean. A copy is available at
 (http://geog.tamu.edu/~sbednarz/surveyform_esd.pdf).

2. South Korean Context

Since the United Nations declared 2005 to 2014 as the Decade of Education for Sustainable Development (DESD), governments have been encouraged to include ESD in their respective educational systems and strategies, and South Korea responded positively. To promote implementation of ESD at the national level, the Korean government prepared an 'action plan for ESD' through public-private dialogue. This action plan aims to achieve four objectives: expanding and integrating ESD in school curricula; carrying out education programs on sus-

tainable development for public servants, citizens, and companies; supporting the creation of a SD training program for experts; and establishing a sustainable development network in private, public, industrial, and academic sectors (PCSD 2006).

Despite rigorous efforts by the Korean government to implement ESD in the schools, ESD still plays a rather peripheral role. Obstacles include competition for attention in the university entrance examinations and a low level of ESD awareness among teachers and administrators (Lee et al. 2005). According to a survey conducted by Lee et al. (2006), many teachers (68.2 percent) report that they have never heard of 'sustainable development' or 'sustainability'. Interestingly, about 40 percent of the same teachers indicated they were teaching about environment, human rights, and peace, topics that would support ESD effectively. In fact, confusion concerning the difference between environmental education and ESD is not uncommon in South Korea (Choi 2004).

Through grade 12 the curriculum in South Korea is controlled by the National Curriculum system. Thus, if ESD is to be taught, it is crucial that it be included in the national curriculum. When Lee et al. (2005) examined the relationship between ESD and the national curriculum (grades 7 through 9) by analyzing the statement of aims and objectives of course content, they found that ESD topics were covered under 'ethics', 'social studies', 'science', and 'technology/home economics'.

2.1 Methodology & Sample

In Korea, the questionnaire was distributed to geography and social studies teachers who participated in an annual professional development workshop organized by the Korean Teachers and Education Workers Union in January 2007. The workshop drew a national audience. A total of 63 teachers (43 geography teachers and 20 social studies teachers) completed the questionnaire. Twenty-two taught middle and 41 high school, respectively. Teachers ranged in experience from 1 to 23 years; 10 years was the average. One middle school teacher taught Korean history (the rest taught geography or other social studies). Of the high school teachers, 24 taught World, Korean or Economic Geography, the remainder taught general social studies or other specific social studies courses (e.g., Economics). Including social studies teachers in the study provided an opportunity to compare the perceptions of geography teachers with those of social studies teachers.

2.2 Results

2.2.1 Definitions of Sustainable Development

The definition of sustainable development proposed by the Brundtland Commission, 'Development that meets the needs of the present without compromising the ability of future generations to meet their own needs' was used to evaluate teacher respondents' perception of sustainable development.

Of the 57 respondents who said they were familiar with sustainable development and who provided a definition, 29 were fully aligned with the Brundtland Commission definition; 26 were partially aligned; and 2 displayed significant misunderstanding of the concept. Of the 26 partially aligned responses, 21 did not include any mention of future generations. Many of the teachers in the study considered the concept of sustainable development as an attempt to balance economic development with environmental protection.

Although more than 50 percent (23 out of 43) of geography teachers understood the concept of sustainable development well, an earlier survey conducted by Lee et al. (2006) reported that only 31.5 percent of all Korean teachers were familiar with the concept. It is likely that this difference is a result of the subject matter that they teach. Geography and social studies should be more supportive of ESD than many other school subjects.

2.2.2 Curricular Emphases

Geography teachers reported that, in general, the two subject areas they used to support ESD most often were development-related topics (e.g., regional development, natural resources and development, pollution) and environment-related topics (e.g., ecosystems, climate change, desertification). For social studies teachers, economic topics were most often used to support ESD, especially 'quality of life'.

When both groups were asked which specific ESD topics they taught, 18 were mentioned by more than 80 percent of the respondents. These are listed in Table 1. 'Desertification' and 'climate change' were taught by all geography teachers. 'Regional economic circles', 'ecological footprint', and 'environmental modeling' were the three topics covered least frequently. In general, geography teachers taught more topics related to sustainable development, especially those related to physical systems and natural resources.

Table 1: Topics Covered and Emphasized by Korean Geography and Social Studies Teachers

% of Teachers	Geography Teachers	Social Studies Teachers
>90	Desertification, **Climate/global change,** Greenhouse effect, **Human-environment interaction,** Pollution, **Environmental degradation,** Rainforest, Recycling, Population, Exhaustion	**Quality of life,** Desertification, Environmental protection
80 to 90	**Quality of life,** Economic development, **Ecosystems,** (non)renewable resources, Environmental impact, **Sustainability,** Nature, Environmental change	Economic development, **Climate/global change,** Greenhouse effect, **Human-environment interaction,** Pollution, **Environmental degradation,** Recycling, **Ecosystems**

In addition to identifying the topics they covered, teachers were also queried about which topics they emphasized. Topics in bold type in Table 1 were emphasized by at least ten of the teachers. Although four topics were emphasized by 13 or more geography teachers (quality of life, global change, human-environment interaction, and environmental degradation) only 'quality of life' was emphasized by as many as ten social studies teachers. Other topics mentioned by more than 10 percent of teachers were 'ecosystems', 'environmental protection', 'poverty and environment', 'greenhouse effect', 'sustainable life styles', and 'social justice'.

2.2.3 What Teachers Would Like to Teach

The final section of the questionnaire asked teachers which topic(s) they would like to infuse into their courses. To some extent, the respondents' choices reflected their curriculum. Geography teachers, whose classes already include more physical science, desired to incorporate more social or cultural aspects of SD such as 'simple living', 'health/healthy life style', 'cultural sustainability', 'gender', and 'environmental politics'. Only 'regional economic circles' was mentioned by more than two social studies teachers.

A focus on environmental aspects and the so-called 'environment-economy relationship' have dominated issues of sustainable development during the last decade in South Korea. Recently, however, there has been increasing recognition of social and cultural aspects of sustainable development. Therefore, it seems important to engage the geography and social studies teachers in a truly integrated understanding of sustainable development that considers environmental, physical, economic, social, and cultural aspects, as well as the relationships among these components.

3. United States Context

Implementing ESD in the United States is a challenge because until recently relatively little public attention was paid to environmental issues, environmental awareness and literacy remain generally low, and only 23 percent of the public is likely to perform pro-environment behaviors (National Environmental Education and Training Foundation 2005, xiv). In addition, sustainable development is also more controversial in the United States than in many other developed countries (Bednarz 2006). A factor inhibiting ESD's implementation in school curricula is that it has no obvious, single, disciplinary home. In geography, the environmental perspective has always been important. The discipline has consistently identified the relationship between society and environment as a principal area of inquiry (Turner 2003). A previous study of the quantity and quality of support for ESD in high school geography textbooks (Bednarz, Petersen, and Bednarz 2007), found that none of the texts directly supported sustainable development, although none took an explicitly anti-sustainable perspective. Finally, as states, which have almost complete control in the absence of a national of a curriculum, require more and more accountability through high-stakes testing, teachers have fewer opportunities to diverge from mandated curricular guidelines.

3.1 Methodology & Sample

Respondents were selected randomly from the listserve of the Texas Alliance for Geographic Education (TAGE), an organization of approximately 410 teachers, subject specialists, and college professors dedicated to enhancing geographic education. Eighty-four TAGE members (approximately 20 percent) were contacted via email and invited to participate in the survey. There were five bad addresses and one person was randomly selected twice. Of the 78 viable contacts, 29 agreed to participate. Completed surveys were received from 25 respondents by May 22, 2007, a 32 percent rate of return based on the 78 contacts, an 86 percent rate based on those who agreed to participate.

The respondents included three university instructors, four social studies subject specialists with an interest in geography, one grade-6 World Cultures teacher, and 17 high school World Geography teachers. The average number of years of teaching experience was 17, ranging from 2.5 to 37. Responses were organized and summarized using a spreadsheet and simple statistics. The definitions of sustainable development provided by respondents were analyzed using grounded research methods independently by two of the authors.

3.2 Results

3.2.1 Definitions of Sustainable Development

Of the 25 respondents, 21 indicated familiarity with the term, 'sustainable development'. Of those, 14 stated that they taught about sustainable development, four said they did not, and

three gave a qualified positive answer indicating that they taught about sustainable develop-ment without naming it. One teacher wrote, 'Using the term, no. Using the concepts some-times—more often than I thought from looking at the list of terms'.

Definitions provided by respondents were analyzed to discern alignment with the Brundtland Report's commonly accepted definition of sustainable development. As noted previously, although it is possible to define SD simply and concisely, it is a complex concept with both positive and negative associations. This complexity means definitions can be nuanced and either wholly or partially in agreement with its key components of *present* development that will not have a negative effect in the *future*. Of the 21 respondents who said they taught sus-tainable development and provided a definition, only one-third (8) were judged to be fully aligned: 'I usually explain it to my students as, "developing smart ways to use our resources now so that there will be something left for future generations. We have to look at it three ways: economically, socially, and environmentally" ' (Respondent 22).

Nearly half of the definitions (10) were only partially aligned. Of these, five did not include a reference to a key component of the Brundtland definition—the health, safety, and prosperity of future generations: 'Development that helps to preserve the environment and conserve resources while also providing for economic support in the area' (Respondent 18). The re-maining five definitions either ignored or misinterpreted key aspects of sustainable develop-ment: 'Sustainable development is a minor solution to deforestation and other environmental problems related to man's overuse. In the case of the rainforest it means growing cash crops that may be used for fruits and other uses without destroying the ecosystem and using it up. The crop is used season to season' (Respondent 25). In this example, while the term 'season to season' could be understood as a reference to the future, it could also be seen as a statement related only to the concept of a renewable resource. Other partially flawed definitions mistook sustainable development for environmentalism or conservation and referred to 'not harming nature' (Respondent 1); or not 'destroying resources' (Respondent 12). Three definitions were not accurate or showed significant misunderstanding of the concept: 'We don't develop more than we can hold in an infrastructure, i.e., schools, hospitals, etc.' (Respondent 8); 'increase pressure in the environment' (Respondent 13).

3.2.2 Curricular Emphases

Table 2 displays the concepts covered in their classes by more than two-thirds of respondents.

Table 2: Topics Covered and Emphasized by US Geography and Social Studies Teachers

Concept (number who emphasized)	Number (Percent)	Concept (number who em-phasized)	Number (Percent)
Pollution	25 (100)	**Water resources (4)**	21 (84)
Population (9)	24 (96)	**Economic development (5)**	20 (80)
Climate/Global change	23 (92)	Greenhouse effect	20 (80)
Human environ-ment interaction (10)	23 (92)	Environmental change	19 (76)
Conservation	22 (88)	**(Non)renewable resources (4)**	19 (76)
Rainforest	22 (88)	Environmental degradation	18 (72)
Desertification	21 (84)	Poverty & the environment	18 (72)

The concepts most often emphasized are in bold (followed by the number who emphasized that particular concept) the in table. Clearly a core of teachers uses population issues and

economic development and its subsequent impact on the environment as organizing themes. Three related topics: 'water resources', 'renewable/nonrenewable resources', and 'carrying capacity' (a concept taught by only 56 percent of respondents) were identified by four teachers each as concepts they emphasize. The three concepts with which respondents were least familiar were 'food miles', 'environmental modeling', and 'carrying capacity'.

3.2.3 What Teachers Would Like to Teach

Respondents frequently did not indicate which topic(s) they would like to add to their courses, perhaps because they perceive the curriculum is already full. However, GIS to support learning about sustainable development was identified most frequently (6 teachers) as a possible addition. Also mentioned: 'social justice' (5), 'gender/underrepresented populations' (4); 'environmental responsibility', 'sustainability', 'poverty and the environment', and 'cultural sustainability' (3 each).

4. Discussion and Implications

This study identified some similarities and several differences between instruction in sustainable development in United States and South Korean middle (secondary) and high (tertiary) schools and in teachers' knowledge of, and attitudes toward, ESD. Although large majorities of teachers from both countries claimed familiarity with SD, approximately 12 percent more Korean teachers gave definitions that were fully aligned with the Brundtland Commission's conceptualization. For those who gave less than satisfactory definitions, the most frequent problem was that both groups did not mention the impact of current practices on future generations. Of the most commonly covered topics listed by teachers from both countries, 11 topics were identified in common. 'Conservation', 'water resources', and 'poverty and environment' were listed only by US teachers; 'recycling', 'exhaustion', 'quality of life', 'ecosystems', 'environmental impact', 'sustainability', and 'nature' only by Korean teachers. Among the topics emphasized, three were listed by US and Korean teachers—global change, human-environment interaction, and environmental degradation. 'Population', 'water resources', 'economic development', and '(non)renewable resources' were listed only by US teachers; 'quality of life' and 'sustainability' only by Koreans. Among topics that teachers would like to introduce, Koreans were most interested in adding more social and cultural topics whereas the only topic mentioned by a significant number of US teachers was GIS.

If our goal is to increase the amount and quality of ESD taught in classrooms around the globe, we must make a greater effort to understand teachers' conceptualizations and attitudes of ESD and the educational context in which ESD can be implemented. The opportunities for future research in this area are rich.

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Education For Sustainable Development: Watersheds As Critical Environmental Regions

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Abstract

Watersheds are exceptional examples of geographic regions. Existing at the interface between hydrosphere, atmosphere, lithosphere, and biosphere, they also function under human influences based on cultures, values, economics, and politics. This paper concerns educating future teachers about the geographic significance of watersheds in relation to sustainable water resources. The IDEAS project involves developing teacher-training modules that feature and stress multinational-multicultural understanding about water resource sustainability.

Geography provides an excellent set of perspectives, knowledge, and skills for building an understanding of watersheds as critical environmental/geographic regions, and as complex systems involving interactions between natural processes and human activities. Curricula for precollegiate geography in the U.S. currently devote only modest inclusion to sustainability issues. However, geography curricula in many U.S. States continue to be influenced by the content of *Geography for Life,* the National Geography Standards (GESP, 1994), which offers many opportunities for the inclusion of sustainability factors and issues, both physical and human. Illustrating a direct set of links between sustainability issues to the National Standards is a reasonable strategy for infusing sustainability into geography instruction.

Keywords:	Sustainable Development, Watersheds, Water Resources, Teacher Education, National Geography Standards.

1. The IDEAS Project and Watershed Sustainability in Geographic Education

The IDEAS working group (Boehn & Henry, 2006), associated with the Georg Eckert Institute, selected "Water" as its focus among the topics that UNESCO (2006) cited as essential for sustainable development. This IDEAS project involves developing geography-based teacher-training modules to integrate and emphasize multinational/multicultural perspectives about sustainability of water resources. Education has been noted as a key factor in promoting proper watershed management (Natural Resources Law Center, 1995). Effective watershed stewardship is fundamental to the sustainability of freshwater resources.

The strategy for these modules is to gather, compare, and synthesize information and perspectives about water sustainability issues from multiple countries and/or regions. The project goal is to develop a better understanding about international/intercultural differences among approaches to water resource sustainability. This paper addresses watersheds from a geographic perspective, as part of the United States contribution to IDEAS' multi-national effort toward offering international perspectives on sustainability of water.

1.1 Watershed Teacher Training Module: Format

Watershed sustainability information will be integrated into modules that employ a threefold approach to teacher education: lecture, field trip, and seminar. Module content development is ongoing, and will continue to progress as the IDEAS work group meets in autumn, 2007.

The lecture component will address as watersheds as natural systems, and their importance to water resources, economic viability, ecological health, and other relevant aspects of sustainable development. The importance of *geographic* knowledge and techniques will be stressed, as they relate to the understanding and stewardship of watersheds. Case studies of problems and potential solutions in watershed sustainability will be discussed. Information sources about watershed sustainability principles will be outlined, along with existing educational resources.

The field trip will concern study of watershed environments and impacts, giving consideration to issues, problems, and management. The objective is to understand the nature of watersheds through direct observation, to assess the degree to which sustainable development practices exist or are needed, and to recommend viable solutions.

The seminar will involve discussing and applying information learned thus far, on critical review of existing materials, and on the presentation of student-produced lesson plans developed for a specific learning environment. Intercultural examples will be encouraged.

2. Watershed Sustainability and the Six Essential Elements of the National Geography Standards

Watersheds are eminently geographic components of the landscape. Geography provides an excellent set of perspectives, knowledge, and skills for building an understanding of watersheds as critical environmental/geographic regions, and as complex systems involving interactions between natural processes and human activities. Precollegiate geography in the U.S. currently emphasizes human rather than physical factors, and gives only modest inclusion of sustainability issues (Bednarz, Petersen, & Bednarz, 2007). Nevertheless, the physical geographic aspects of environments are threaded throughout *Geography for Life*, the National Geography Standards for the U.S. (GESP, 1994). *Geography for Life* outlines six "Essential Elements" containing a total of eighteen "Standards," to represent what a "Geographically Informed Person" should know and understand. The document also lists five basic skills that outline the problem-solving processes applied in seeking to answer geographic questions.

The National Standards have influenced the geography curricula of many U.S. States and have provided a basis for statewide testing of student achievement. Geographic education about watershed sustainability (or other sustainability topics) aimed at teachers, therefore, will benefit by using the National Standards as a basic framework. This approach will help teachers educate their students about the importance of water sustainability by demonstrating how watersheds fit into the curricular framework they will likely use in teaching geography. The material presented here conforms to the National Geography Standards' six Essential Elements (GESP, 1994): 1) The World in Spatial Terms, 2) Places and Regions, 3) Physical Systems, 4) Human Systems, 5) Environment and Society, and 6) The Uses of Geography.

Each of the six Elements, and most of the Standards they contain, can be related to geography education about watersheds and their impact on water resource sustainability. This paper examines only the six Elements, but the content can be expanded to include specific Standards. Outlined below in their order of presentation in *Geography for Life*, the Elements are not intended to represent a step-by-step process sequence. Studies of watershed sustainability may include aspects of all or most of the Elements, because they are interrelated.

2.1 The World in Spatial Terms: Geographic Information and Analysis for Watershed Sustainability

This component engages the students in research and analysis of geographic information about the watershed(s) of interest. This will involve some mix of map interpretation, remotely sensed image interpretation (multimedia, multi-scale, multi-date, multispectral), fieldwork, gathering and display of data, and Geographic Information Systems. Development of a mental map, a conceptual model of the watershed area, or a hardcopy map either sketched on paper or drawn using a computer, may be helpful in this analytical process. Geography offers a suite of spatial-analytical and process-oriented techniques that can facilitate problem solving and decision-making concerning watershed sustainability and its influence on water quality. Maps, data, and information about virtually every watershed in the U.S. and its river system can be accessed from the U.S. Geological Survey's (2007) "Science in your Watershed" website, and the World Conservation Union (2007) offers an online atlas, "Watersheds of the World: eAtlas," with maps and information about major watersheds worldwide. The information that these websites offer invites comparative studies of watersheds in diverse locations, of diverse sizes, or having diverse physical or human characteristics. Geographic similarities also invite investigation. The scale of analysis can be from local to regional or global.

2.2 Places and Regions: Watersheds as Geographic/Natural Regions

Watersheds, the catchment areas for streams and rivers, are perhaps the most natural, logical, environmentally critical, and least abstract geographic subdivisions of our planet's land areas. It is important to understand the nature of watersheds as geographic regions that vary in terms of their environmental/geographic setting.

Regions function as conceptual models, spatial tools for seeking to understand how, why, and in what ways areas differ or are similar according to certain specified attributes. Watersheds exist within other regions and they also contain subregions. These spatial divisions and subdivisions may be based on physical, or human criteria, many of which can exert impacts on a watershed. Regions can be defined by the presence or absence of certain attributes that can be visually discriminated and mapped such as landform characteristics or vegetation associations. Regions can also be defined by characteristics that we cannot see, but we can monitor and measure, such as quantitative variables representing hydrologic, climatic, vegetative, or geologic conditions, or factors related to human activities. Because watersheds are delimited by drainage divides, physical features that can usually be visibly traced, the regional boundaries of a watershed are easy for students to conceptualize and comprehend in comparison to the edges of other more abstract, statistically defined, regions.

2.3 Physical Systems: Watersheds as Natural Systems

Watersheds provide excellent examples of natural/environmental systems as they function at the interface that integrates the hydrosphere, atmosphere, lithosphere, and biosphere. Virtually every land surface on Earth is part of a watershed, and with the streams that occupy these basins they tend to develop well-integrated natural systems, involving water, soil, rock, terrain, vegetation, and wildlife. Watersheds share the hierarchy of stream numbers and can be subdivided into smaller sub-basins. Water quality can be monitored for the entire system or for any sub-basin. Further because streams form a downstream flow network, certain problems can be traced upstream or followed downstream.

The environmental processes and components of a watershed are interrelated, and can be examined in the context of a local/regional subsystem of the hydrologic cycle. Problems in one part of the watershed system are likely to cause problems elsewhere, and watershed problems can also directly affect groundwater resources. Biotic habitats in these basins are affected by water quality, which is a function of the environmental conditions of the watershed.

Watersheds are open systems, and the main throughput is water, which is continually affected by the quality of inflow and the physical-human geographic conditions over which the water flows. Increasing human populations and land use intensities place pressures on habitats and water quality in the stream system, sometimes to the point of reaching critical threshold conditions. Domesticated animals and human activities add complexity and affect feedback interactions within the watershed system. Interactions among the physical processes and attributes of a watershed set the environmental stage upon which human systems and other natural systems operate and influence the sustainability limits that exist.

2.4 Human Systems: Human Influence and Reliance upon Watersheds

Watersheds also function as a under a myriad of spatially varying human influences based on population densities, cultures, values, economics, and politics. Types and intensities of land use and settlement densities varying from sparse and isolated, to rural, suburban, or urban, as well as their extent and location, are elements of the human landscape that provide a different set of environmental conditions within a watershed. Varying human needs and cultural perspectives also influence the way a watershed and its resources are perceived.

Surface water from watershed sources provides much of the potable water resources for the world's population. Many human populations are concentrated along riparian corridors--rivers tend to attract populations and divides tend to separate them. Population growth increases the need for fresh water, and also increases the human impact on these resources, especially along rivers, the conduits of this essential resource. Growing populations require an increase in irrigated agriculture, which draws heavily from surface water resources. Unfortunately, the quantity and quality of freshwater resources cannot keep pace with population growth, and the resultant increase in water needs. Further, increasing levels of economic development equates to a greater need for water. One of the most crucial environmental responsibilities faced by humankind is monitoring, maintaining, and protecting the quality of freshwater resources.

Delimited by humans, often without regard to topography, the borders of most political and administrative regions do not coincide with watershed boundaries. A stream system may flow through or along many counties, cities, states, or more than one country. These jurisdictions may have very different needs and strategies for using and managing their part of the watershed and its water resources. Divergent political and economic agendas that affect the competition for water resources will continue to be a problem in the foreseeable future.

2.5 Environment and Society: Human-Environmental Interactions in Watersheds

Few of the world's major watersheds and the rivers that drain them have been untouched by human activities, and many have been significantly modified. Nilsson, *et al*., (2005, 405) have summed up the immense global extent of this human impact stating that, " . . . more than half of the 227 largest rivers of the world are strongly or moderately fragmented by dams, diversions, and canals." Further, they state that dams exert a considerable impact on freshwater

ecosystems, and that water withdrawal and usage on dammed rivers is about 25 times greater than that from free flowing rivers. Evaporation loss from impounded water in reservoirs is also a problem, as well as salinity increases in reservoirs that exist in arid regions.

John Wesley Powell (1879) felt that dividing land along watershed boundaries would provide a sense of community among residents who would share the water resources of that drainage area. Cooperative management of a watershed system as a whole is the optimal approach to sustainability. The U.S. Environmental Protection Agency (1996, 1997) urges this management approach and cooperative river basin authorities have been established to encourage a unified effort for protecting a shared watershed.

However, human efforts to divert water from one watershed to another, sometimes over great distances, means that watershed management and sustainability decisions affecting that water source are spatially distant processes, and may be politically removed from those who use the water. These combination natural-artificial water systems have been termed "hydrocommons" by Weatherford (1990), who pointed out that this approach to water apportionment, spreads the "community" of water users over a large region. In many regions that experience seasonal droughts, water is piped or channeled in from areas that are more humid (*e.g.,* mountain regions), which contributes to a human-environmental disconnect with the water source.

Humans affect watersheds and *vice versa*. Because of the interactions between humans and their physical environment that have an effect on watersheds, geography's integrative nature lends itself well to understanding sustainable watershed management and stewardship.

2.6 The Uses of Geography: Geographic Inquiry Applied to the Sustainability of Watersheds

Having a grasp of the processes, attributes, and conditions of natural and human systems, as well as their interaction and spatial configuration, is essential to the geographically informed person. A solid geography education not only includes knowledge and learning, but it also stresses understanding through inquiry, that is, *doing* geography. Geographic inquiry implies having the background and ability to ask, and seek to answer, relevant geographic questions.

Learning how to think about, reason with, seek to understand, and synthesize, geographic information and its spatial context, is beneficial to problem solving, and finding answers. These processes and the insights they generate also facilitate making informed decisions that concern many critical issues that affect watershed sustainability. Geographic knowledge helps us to recognize and appreciate present-day environments, comprehend influences from the past on the conditions we experience and observe today, and to make logical and reasonable projections of current trends into the future. With this background, citizens should be well informed about, and well prepared to influence, watershed sustainability issues and decisions.

3. Conclusion

The IDEAS project aims to educate future geography teachers about how and why perspectives about water as a resource may differ, based on region, nationality, or culture. A teacher-training module concerning these and other geographic aspects of water resource sustainability can be an effective vehicle for education about this important topic. In the U.S., the National Standards can be used to structure sustainability information to fit current curricula, as in this example that deals with watersheds. Education about environments and their sustainability has been shown to influence positive changes in the stewardship of watersheds and also for a variety of natural resources (Natural Resource Law Center, 1995). As agents of change, future

geography educators can use the information and materials they gain and develop to instill their students with the knowledge they need to be enlightened citizens, aware of the essential nature of watersheds and their role in the sustainability of water resources.

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Education For Sustainable Development In China

Wang Min (Beijing), Wei Dongying (Beijing)

Abstract

Education for Sustainable Development in China began in 1990s' after Sustainable Development was put forward formally at the United Nations Environment and Development Conference held in Rio de Janeiro in 1992. Currently, Sustainable Development is part of the basic policy of China, and ESD is becoming more and more important. Efforts involving ESD research and practice in China have been promoted mainly by the government, and by international organizations through the programs of research and training. Examples include research on the origin and international comparison of the Education for Sustainable Development project of Chinese Ministry of Education, and the Germany-China Teacher Training Program on ESD etc. At present, the research framework concerning ESD has been established in China through studies of its basic content, main problems, and existing content in the school curricula, as well as the content and methods of teacher training programs. In the new curricular reform, it is requested to include the subject matter of ESD into many subjects, including Geography, Physics, Chemistry, Chinese, Politics, and others. In primary and middle schools, according to new curricular standards, ESD has been put into practice in many ways in schools, such as developing school-based curriculum on ESD, and implementing ESD related extra-curricula activities. The situation for teachers' training on ESD, however, is one of critical need that requires immediate attention. Teacher training on ESD in China is still in a beginning phase, being mainly directed and promoted through international programs and nationwide graduate classes on ESD curricula that have been initiated by Beijing Normal University and the China Environmental Protection administration.

Introduction

The article analyzes the current situation of ESD in China and present the results of this analysis. The following depiction is based primarily on school textbooks and curricula, but also includes contributions from governmental institutions, schools and NGOs.

1. Environmental Education Reoriented towards Education for Sustainable Development in China

Environmental Education took the first step after the First National Conference on Environmental Protection in 1973. From then on, Environmental Education has gone through the following four periods:
1. The Period from 1973-1983 (the beginning).
In this primal stage, more and more officials in the education sectors and teachers began to realize the importance of including Environmental Education in the course of the primary and middle schools and began to implement it in some primary and middle schools.
2. The Period from 1983-1992 (initial development).
Environmental protection agencies in many areas began to cooperate with educational offices to select schools for experimental implementation, such as Green Schools which have some activities and classes on environmental education. Some areas which began EE early and have made great progress such as Changtu County and Chaozhou city began to popularize their experiences and disseminated their methods nationwide. Teaching methods for EE have been improved through some exchanges in training and experience.

3. The Period from 1992-2000 (rapid development).
In 1993, Chinese primary and middle schools began to implement the teaching plans and use new textbooks that were integrated the content of Environmental Education for nine-year compulsory education. Selected courses on Environmental Education were opened in some schools.
4. The Period from 2000 to the present (EE reoriented towards ESD).
China began to carry out new curricula reforms of basic education starting in 2000, and the "Subject Outline of Environmental Education for Primary and Middle School Students" and "Implementation Guideline of Environmental Education for Primary and Middle School Students" was promulgated by the Ministry of Education in February, 2003, (Wang Min, Wei Dongying,2006P.112-113) and implemented nationwide. In this period, Environmental Education was reoriented towards Sustainable Development. Environmental education focuses not only on environmental factors but also social and economic considerations.

2. Framework of ESD in China

Sustainable Development is a complex and continuously-evolving concept. Many scholars and practitioners have invested years trying to define Sustainable Development and envision how to achieve it on national and local levels. Because Sustainable Development is hard to define and to implement, it is also difficult to teach. Creating an ESD framework that is suitable for China is a mandatory prerequisite to incorporating the ideas of Sustainable Development into the curricula.

Experts involved with the program of research on the origin and international comparison of the Education for Sustainable Development initiated by China Ministry of Education worked out the ESD framework. Their approach integrated the studies of its basic content, main problems, and existing content in the school curricula, as well as the content and methods of teachers' training programs. Today the framework is a guide for ESD in China (see Figure1).

A new curricular reform of basic education has been carried out in China since 2000. In this reform, one of the general targets of the curricula is, "to build up a scientific notion about population, resources, the environment and Sustainable Development" (China Ministry of Education, 2003, P.1). The notion of ESD is embodied in the curricular criteria of relevant subjects, such as Geography, Chemistry, Biology, Physics, etc(Wang Min,2005,P15-16).
For example, in the criteria for the Geography curriculum, it is definitely put forward that ,"the mission of geographic education in the senior middle schools to consolidate the notion of Sustainable Development that population, resources, the environment and regional development are harmonious for each other." (China Ministry of Education, 2003,P.2) Some of the basic concepts are to "let students understand the relationship between human and environment, to pay attention to the problems about population, resource, environment and regional development etc., and form the notion of Sustainable Development, and love of nature and protecting the environment." (China Ministry of Education, 2003, P.2)At the same time, it is clearly stated that "sustainable development is the guiding principle, and human and environment relationships are the main focus, and it is emphasized the problems about population, resource, environment and regional development, etc. that mankind is confronted with" in the process of designing curricular reform.
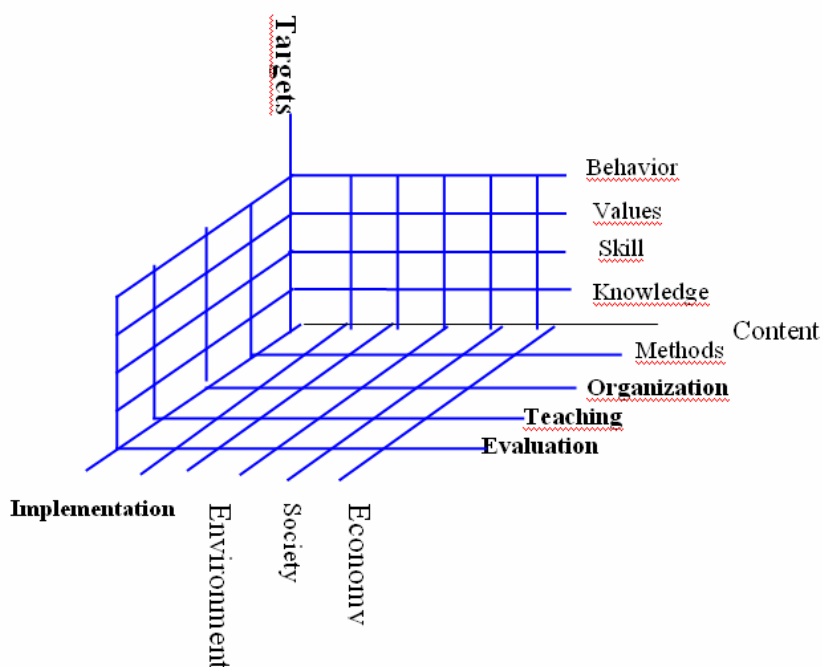
Figure 1. Framework of ESD

In the curriculum criterion of Chemistry for high schools, it is clearly stated that "Chemistry makes students form a scientific notions about nature and fact-oriented attitude about science, to deeply understand the interrelationships between science, technology and society, and to build up the notion of Sustainable Development step by step." (China Ministry of Education, National Chemistry Curriculum Standard, 2003,P.1) "Chemistry also plays a very important role in solving relevant problems that humans confronted with in the process of social development, in improving their living quality, and in promoting a harmonious relationship between mankind and the environment." (China Ministry of Education, National Chemistry Curriculum Standard, 2003,P.1)

In some curricular criteria, especially Geography, Physics, Chemistry, Biology, Chinese and Politics, it is emphasized that the notion of sustainable development that population, resource, environment and society harmonize with each other, and it is also the keystone of ESD. The educational targets of the curricula not only include the knowledge and skills about sustainable development, but also the emotion, attitude and values of sustainable development. The students can attain the notion of sustainable development of society, environment and economy by the study of the curricula.

3. Teachers' Training on ESD

With the development of ESD in China, there is a dire need for teachers' training on ESD. Nowadays, the teachers' training on ESD in China is still in the initial stage, and some international programs mainly promoted it, such as the Germany-China Teacher Training on ESD, the EPD Program, and the Root and Sprout Program, etc. Most of these programs are short-term and not systematic. The official departments of education also organize some in-service training for teachers in summer camps or in other venues.

1. The Graduate Curricula Class on ESD initiated by Beijing Normal University

Beijing Normal University held the first graduate course on ESD in China in 2003, and the students who enrolled were 29 teachers and principals from primary and middle schools. Six courses have to be completed for two years, these courses are held on every Saturday, and their titles are:

Panorama of Education for Sustainable Development,

Theories and Practice of Education for Sustainable Development,

Activity Design and Implementation Guide on Education for Sustainable Development,

Evaluation of Education for Sustainable Development,

Theories of Sustainable Development,

School Management and School-based Textbooks on Education for Sustainable Development.(Wang Min, 2005, 23-25)

This graduate course on ESD is the result of an adventure: an expedition into unknown territory. The teachers from the primary and middle schools welcome this module of training. Beijing Normal University will continue to cooperate with the China Environmental Administration to hold the second graduate course on ESD, and it will begin in spring, 2006.

2. The Germany-China Teacher Training on ESD Program

The program began in 2003, and more than 50 Chinese teachers participated in the training on ESD in China and in Germany respectively. The advanced methods and concepts of education on the environment and Sustainable Development in Germany were imparted by means of playing games and discussing together. This is an innovative training method for Chinese teachers and had a good effect on their daily teaching.

Sustainable Development is not only a local issue, but also a global concern. Education for Sustainable Development needs efforts from all over the world. The IDEAS project (Intercultural Dialogue on Educational Approaches to Sustainable Development) provides a very good opportunity for communication between nations. The USA, China, and Germany as the three participating countries, will compare their curricula, textbooks, other educational materials, projects, etc. and develop training modules that could be adapted for individual, on-line self-study that is designed for in-service teachers. The teachers will benefit from this training by gaining a deep and comprehensive understanding on ESD.

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Symposium Session: Sustainable Behavior

The Importance Of Conveying To Would-Be Teachers. A Critical Method For The Analysis Of Environmental Issues

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Abstract

The great attention nowadays paid to environmental catastrophes makes the topic unavoidable to geography teachers.

The issue is particularly burning due to its strict relationship with the life of human beings in their respective environments. In fact, while for phenomena normally brought about by nature – volcano eruptions, floods, tornados, tsunamis and the like – the disciplines challenged are mostly within the naturalistic area, in the last decades there is an increasing trend to underline man's responsibility in the genesis of these events. Some examples are DDT and the hole in the ozone layer or the greenhouse effect with the ensuing global warming of the planet and the depletion of resources.

The highly technical character of such topics, encompassing several disciplines, makes it quite difficult for teachers to acquire a real competence. Even more difficult is to come to a synthesis which may be easily handed down to students over normal didactic activity.

On the other side, the huge mass of information available through mass media, often masterly presented by journalists, allures teachers to bring this kind of literature directly into the classroom.

The truth is, however, that such topics are often of a controversial nature, so that it is absolutely necessary that in the courses held to form future teachers some guidelines are provided in order to help them to attain a personal vision of things. These general guidelines in turn will support their efforts to face any other issue which might become relevant in the future.

Keywords: Geography, Environment, Education, Hazards, Climate

Fifteen years have already gone by since E. Goldsmith and others wrote that only 5,000 days separated mankind from the ecological catastrophe. Nowadays there are many reasons for dissatisfaction as to the state of the environment. No doubt, however, the catastrophism of certain forecasts, although supported by men of science, appears at least excessive.
In this field, the fundamental study of B. Lomborg was published for the first time in 1998. Notwithstanding, *The Living Planet Report 2006* by WWF denounces that within 50 years earth's resources – clean water, energy, cultivable land, wildlife animals – might be exhausted.
The alarm refers in particular to the degradation of natural ecosystems, a phenomenon monitored through the loss of biodiversity.
In the last decades, the reports produced by environmental organizations such as the WWF, the World Watch Institute, Greenpeace and the Friends of the Earth have attained a growing

impact on the society influencing its attitude towards political decisions susceptible to provoke an environmental fall-out.

What is of more relevance, this new category of opinion makers is moulding our interpretation of reality, in a field which is basically the same of professional geographers.

It is interesting to note that everywhere geographers are mostly engaged as civil servants, their task being that of teachers at various levels - from primary school to university. The environmentalist associations on the contrary are non-governmental organizations, that is to say private entities take on the education, which, at least in the European tradition, is a typical public function.

The target of this education are not only adults, but in particular the young generations. The young are easily attracted by a form of scientific knowledge offered by non-compulsory institutions, which stimulate personal creativity and propose a sort of partnership in outdoor activity, competitions etc.

It is a new channel of mass education, alternative to the official school system, which is highly valuable.

Now, what I want to underline is the fact that the ideas, the practices, and sometimes the ideologies promoted by the NGO's are widely entering the schools.

First of all, the easy availability of printed material, backed by the authority gained by the organizations, exert an irresistible appeal to the teachers, especially those graduated in natural sciences.

In this case, the teacher is persuaded to adopt this material, transforming himself in good faith into a drive-belt of the culture elaborated inside such organizations. In good faith, because this kind of vision is highly promoted through the media and attracts wide political support.

A second channel, even more direct, is represented by the growing access to school gained by activists and experts coming from these circles.

In principle, all this appears praiseworthy, since it represents an opening of the schools towards society, a goal we all share.

These practice, however, are not neutral. Both of them open the mind of young people to a knowledge which has its origin in private groups, lacking a reliable scientific structure. They sum up a do-it-yourself attitude to the promotion of selected scientific results coming from professional laboratories. All things considered, in many cases they devote themselves more to advertising than to research.

Advertising of what? In the interest of whom? That is the key question, because there is no guarantee about the reliability of the issues that are being diffused.

Here the peculiar role of the teacher emerges, who has the task of decoding an everchanging world and to reduce the information to learning units that are palatable to his students.

In this paper I concentrate on the first phase, i.e. the decoding of the information coming through the media and the understanding of the reality of events, by no means an easy task.

In fact, scientific objectivity does not exist, for the simple reason (Sermonti, 1971) that from the same material two scientists may draw different conclusions, both of them true, although under certain aspects one of them may overcome the other, but not to the point of making it completely false.

Only the passing of time gives reason to the right (or true) interpretation.

It is therefore of paramount importance to warn our students against an uncritical acceptance of the positions maintained by the majority of experts, politicians and the like supported by the media. Unfortunately, the democratic process cannot be considered a reliable tool in order to reach a scientific truth.

Two examples from the recent past suggest us to be very cautious before accepting a widely promoted thesis.

One is the DDT case. The *National Geographic* magazine dedicated the cover of its last issue (July 2007) to the new spreading of malaria in the third world. Now malaria is endemic to 106 nations and is threatening half the world's population. The readers may discover, much to their astonishment, that the epidemic is following the ban on DDT in the 90's. What is even

more astounding is to learn (Biagini, 2006) that the thesis reported in the famous book *Silent Spring* (Carson, 1962) was false. An accurate control of the research data quoted to demonstrate the dangers of the insecticide reveals that data did not support Carson's thesis. And between 1941 and 1961, at the top of DDT spraying, the number of birds increased in the whole of North America. It is now proved that the insecticide is not dangerous to birds and moreover decays very quickly (about 90% in one month).

As for the consequences, in three case study areas in South Africa, malaria cases increased by 7 times after the stop to DDT, and the disease was put under control only after renewed spraying since 2000.

On a worldwide scale, the ban may have killed as many as 20 million children. What a pity, scientists have given doubtful information, environmentalists and journalists have communicated altered information, and we all, as teachers of geography, have contributed to the marketing of new, expensive insecticides the poorest countries cannot afford.

A very similar case is that of the ozone hole. Discovered three times – in 1956, 1982 and 1985 – it gave the multinationals Dupont and ICI the opportunity of imposing to all countries the replacement of chlorofluorocarbons with their hydrofluorocarbons.

Fundamental studies since the end of the 80's proved that the ozone hole is a natural phenomenon, depending on the sun's activity. Therefore, the ecological catastrophe we have been predicted is nothing else than a myth. A "scientific" myth. Nothing strange, in an epoch when science tries to replace religion as the pillar of human behaviour. But also in the old, good times, when economic matters were at stake, it was not difficult to find a contested bishop willing to condemn Jeanne d'Arc to the stake.

In both cases, the goal was to stop the manufacturing of chlorine-based products, whose patents were decayed, giving free access to this technology to every country.

What a pity, hydrofluorocarbons are more toxic and more dangerous than the old gases, but cost five times more.

The globalized world requires a global thinking. It means a scale of analysis covering the whole planet and an interdisciplinary reasoning. All this poses a number of problems to the geography teacher, who is accustomed to think in terms of areas or, better, regions. Inside these, a limited number of attributes are selected, in order to describe the prevailing way of life.

Now we are facing the task to understand the forces which are structuring the global by destructing the old ways of life and replacing them with new ones. *What America is, the rest of the world shall become* seems the motto of present world.

To understand the forces in action you must identify the right variables and the right cause-effect relationships. And many of these relationships are linking phenomena of different type. See for instance the relationship between a scientific discovery – the hole in the ozone layer – pertaining to the domain of physics, and chlorofluorocarbons – a product of the chemical industry.

The strategy of multinationals – which is part of business economics – the action of environmental organizations, papers and journals – pertaining to the field of mass communication – the political decisions to ban the said chemicals – here we are in the field of politics, and finally the side effects of stopping the fight against malaria in the third world – here we are in the field of medicine and development studies.

A geographical curriculum should lead graduate students to link together all these phenomena. Otherwise, it is impossible to understand the "big game" which is moulding our world.

Is it conceivable that a single teacher may master all these disciplines, and get access to all the relevant information? This is the challenge for our profession at the beginning of the third millennium A.D.

We must train a new generation of teachers capable to do so, but to this aim we need a new generation of manuals, too.

Just to mention a few cases, how many geographical tests inform the reader of the inorganic theory of the origin of hydrocarbons? Have you ever read in our manuals that the end of oil

resources is a media phenomenon which occurs every twenty-thirty years? The same applies to the global warming, a highly recurrent phenomenon related to the sun's activity. In this case, it is characterized by cycles lasting no less than four centuries.

At the end, what advice ought to be given to future geography teachers?

In the first place, to suspect the global interpretation spread by the triad politicians, NGO's and mass media. Secondly, to look for all kind of interpretations, and to compare them before giving credit to one. Thirdly, cherchez la femme! That is to say, like in detective stories, try to bring to the light the economic and political interests concealed behind the story they are telling us.

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Spaces, Cultures And Young People:
Cultural Sustainability In Geography Education

Sirpa Tani (Helsinki)

Abstract

The contents of and relationship between environmental education (EE) and education for sustainable development (ESD) are the subjects of an ongoing debate. Sustainable development is normally defined by dividing it into three elements: ecological, economic and socio-cultural sustainability. In environmental education, because of its background in nature conservation, the ecological aspect has always been strong while the other elements of sustainability have been considered less often. In this article, I will approach ESD and EE from the viewpoint of geography. First, I will briefly introduce three ways to comprehend the concept of the environment: the environment as an entity; the experienced environment; and the socially and culturally produced environment. In geography, as I will argue, all these ways of comprehending the environment can be addressed, and by doing so, the versatile nature of ESD and EE can be highlighted. Secondly, I will take a closer look at the cultural aspects of sustainability.

Socially and culturally produced spaces, concepts of identity and subjectivity, as well as questions of power and resistance, contain meanings that are close to young people in contemporary urban societies. By applying these concepts, teachers could get a better understanding of their students' everyday lives. These approaches could also provide students with help in their interaction with various social groups and sub-cultures, and in various social spaces. I will conclude this article by giving some examples of young people's ways to use public space in order to highlight the importance of cultural understanding in geographical education.

Keywords: Cultural Turn, Environmental Education, Cultural Sustainability, Social Space, Identity, Sub-Culture.

1. Introduction

Researchers and policy-makers hold a variety of views on the relatioship between environmental education (EE) and education for sustainable development (ESD. At least six different ways to describe these concepts in relation to each other can be found. Firstly, EE can be seen as one part of the wider concept of ESD. Secondly, these concepts can be defined so that EE is thought to be the wider concept and ESD one part of it. Thirdly, some researchers think that there is a continuum between these two concepts. According to them, ESD can be seen as a contemporary phase of the process which started from the older concept of EE. Fourthly, these concepts have been thought to show some differences but also some common features. Fifthly, EE and ESD have been defined as totally separate concepts and, sixthly, they have been seen as basically each other's synonyms. This listing reveals the lack of consensus on the definitions of these concepts, and it is therefore important to examine the ways they are used in studies and academic debates (for more about this debate, see Hesselink *et al.* 2000; McKeown & Hopkins 2003; Tani *et al.* 2007). To clarify my views on these concepts, I will open this article by describing briefly three ways in which the concept of environment can be

comprehended. I argue that in geography, environment can be seen as a wide and complex concept, and that by applying its different aspects, environmental education can be used as a synonym for ESD. Geography has much to offer to the aims, methods and contents of environmental education and education for sustainable development.

After introducing these basic concepts, I will continue with issues concerning cultural sustainability. In geography, after the cultural turn of the late 1980s and '90s, there has been a growing interest in different cultural identities, sub-cultures and social spaces. These themes offer some valuable perspectives on the study of culturally sustainable development. I will use these concepts as examples as I discuss the potential of cultural sensitivity in geography education.

2. Multiple Environments, one Geography

Geography is one of the many disciplines dealing with different environments, and it has close links with the aims and contents of environmental education. I have previously summarised the ways in which various academic disciplines use the concept of environment (see Suomela & Tani 2004) and how researchers of environmental education have used the same concept (Tani 2006). Here, I will briefly describe the main characteristics of the concept as based on my previous findings.

Three different ways to define the concept of environment can be identified. Firstly, it can be seen as an entity, which can be investigated from a distance. This kind of approach is characteristic of many scientific studies in which the researcher remains a detached observer, acquiring information from the environment. In geography, this viewpoint can be found in studies of physical geography, but also in many studies of human and regional geography, where the environment is treated as an object (Suomela & Tani 2004).

The second way to define the environment is to get closer to it. This approach reveals the subjective dimensions of the concept and takes the meanings of people-environment relations to the forefront. Subjective images of the environment are important, for example, for studies in aesthetics and environmental psychology (Suomela & Tani 2004). In geography, humanistic geographers of the 1970s stressed the importance of unique environmental experiences and defined place as a lived space. These personal geographies have established their status among other themes of culturally-oriented studies in contemporary geography.

The third approach to the concept of environment is to study socially and culturally produced spaces. This dimension emphasizes the social and political power involved in attaching meanings to the environment. Environmental policy and environmental sociology are examples in which this approach is widely used. The idea of environmentally responsible behaviour, different interest groups and their views on the ideal environments can be mentioned as examples of socially constructed environments. These themes have taken on increasing importance recently because of a growing interest in participatory planning and the idea of multiple meanings of social spaces (Suomela & Tani 2004).

As I have shown above, the concept of environment can be defined in a variety of ways. From the viewpoint of environmental education, all three aspects offer valuable insights. In the first definition, 'environment as an entity', the significance of knowledge, observations and scientific studies of the environment is highlighted. The second definition, that of personal environments, emphasizes the importance of unique feelings attached to people's daily environments, and by doing so, stresses the emotional aspects of people-environment relations. Finally, socially and culturally constructed environments reveal the hidden meanings of power

in decision-making, an understanding of which is crucial before environmentally responsible behaviour and experiences of empowerment can be achieved.

3. Environmental Education for the Ecological Environment only?

Many theorists of environmental education, such as Hungerford & Volk (1990), Robottom & Hart (1993) and Palmer (1998), have used three aspects to define the aims and contents of EE: knowledge *about* the environment, action *in* the environment, and action *for* the environment. When these aspects include all the elements of the broadly-defined environment (which should be the case, as I argue here), environmental education could be as wide a concept as ESD.

There is a strong tradition of the ecological environment being seen as the main element in environmental education. As a result, the other dimensions described above have been left out of the concept of environmental education. Since the background of EE is environmentalism and concern for environmental problems, it is understandable that environmental education has usually been connected to the ecological environment. The concept of the environment has been treated almost as a synonym for the concept of nature. This is still the dominating view in the field, and it excludes some of the previous definitions of environmental education. This kind of definition also seems to dominate thinking in official documents where the aims and contents of ESD have been defined. For example, UNESCO (2005a) specifies three spheres of which sustainable development is composed: the environment, society and economy. In the same document, two examples of environmental issues are mentioned, water and waste. These examples connect the idea of environment simply to the ecological environment only. In sustainable development, the ecological dimension is often called the environmental dimension, which reduces the wide concept described above to only one aspect of the environment.

When the environment is used as a synonym for the ecological environment, economic and social aspects are left out. This is problematic when the concept of sustainable development is considered in its totality. Such a narrow definition is confusing to geographers: what should the other aspects of space be called if the environment is meant for the ecological environment only? For geographers, environmental education as a widely defined concept could bring the field of ESD closer to the traditions of geographic studies and geography education. In the following, I will take a closer look at the cultural aspects of sustainable development and then introduce some elements of cultural geography that could be included in the practices of education for culturally sustainable development.

4. Culturally Sustainable Development: Geographical Viewpoints

Definitions of sustainable development vary, but most often they consist of three elements; environmental, economic, and social. Since Agenda 21, education has been seen as "critical for promoting sustainable development and improving the capacity of the people to address environment and development issues" (UNCED 1993). It has also been stated that since the 2002 Johannesburg Summit, culture has been increasingly recognized as an essential dimension of sustainable development" (UNESCO 2005a). Since cultural aspects are often still included in social sustainability, they are not as clearly defined as ecological and economic dimensions. For example, UNESCO (2005a), when defining the goals for the Decade of Education for Sustainable Development (2005−2014), mentions three dimensions: environmental (e.g. natural resources, climate change, rural development, sustainable urbanization and disaster prevention and mitigation), economic (e.g. poverty reduction, corporate responsi-

bility and accountability, and market economy) and socio-cultural (e.g. human rights, peace and human security, gender equality, cultural diversity and intercultural understanding, health, HIV/AIDS, and governance). Cultural diversity and intercultural understanding are the only perspectives mentioned here that describe goals for cultural sustainability.

The idea of culturally sustainable development is often connected to the protection and preservation of cultural monuments and some specific sites in the built environment which are defined as valuable. Good examples are cultural heritage sites, which are considered to have special meanings that warrant protection for future generations. In addition to these tangible aspects of cultural heritage, UNESCO has extended protection to intangible features, too, the aim being to acknowledge the importance of these intangible elements for cultural identities. 'The cultural masterpieces' were proclaimed in 2001, 2003 and 2005 (see UNESCO 2007) and later, special conventions have been organized for defining the intangible elements of culture and the procedures needed to 'safeguard' them (UNESCO 2005b).

The above actions are important for the acknowledgement of culturally sustainable development, but what is more or less missing is the acknowledgement of the importance of contemporary cultures in different societies. In the following I will open up some ideas to include young people's viewpoints on education for sustainable development.

4.1 Cultural Turn and its Contribution to ESD

The so-called cultural turn in geography during the late 1980s and '90s stressed the importance of many of the intangible aspects of culture that affect people-environment relations. By doing so, it also made some previously hidden elements of spaces, places and cultures visible. Recently, the new cultural geography has paid more attention to the material elements of culture. In fact, John Morgan (2000) has stated that cultural geography and cultural studies can offer new ways of thinking about geographical education. He highlights the inter- and transdisciplinary nature of cultural studies and connects these ideas to geographical education through the notion of 'cultural pedagogy', which also connects education to social sites outside the school context. Morgan (2000, 282) mentions a list of these 'sites', which include libraries, books, television, movies, video games, newspapers and magazines, toys, advertisements and sports. He refers to studies of young people's geographies (Skelton & Valentine 1998), media and film studies in geography (Burgess & Gold 1985, Clarke 1997) and geographies of consumption (Bell & Valentine 1997), and through these examples describes some of the many opportunities that could be applied to geography education. Here, I will use two examples of these themes to highlight the possibilities that geography educators can use to enhance education for (culturally) sustainable development. The first example presents ideas about different identities and the second one introduces some elements of social spaces for young people.

4.2 Cultural Identities and Young People

Children's and young people's experiences, their life-worlds and their own interpretations of the surrounding realities should take centre stage in geography education. The cultural turn, as already briefly described above, gives us some valuable 'tools' for understanding the importance of geographies of everyday life. Culture is no longer seen as something stable, or as the same thing for all people, but as a complex and ever-changing phenomenon. Identities are treated in the same way: it is acknowledged that in contemporary societies, people have a variety of identities, which can be overlapping, contextualized and partial. Meanings of place and local contexts are not seen as stable either; they are negotiated in social interaction. In

subjective places, there are always intersubjective elements present; people attach meanings to their environment based on their own experiences and values, but also based on other people's views, representations created in the media or in other cultural products. It is therefore important to pay more attention to young people's own interpretations of their identities in geography education.

Ever since the birth of commercial youth cultures in the 1950s, there has been an ongoing trend towards more fragmented sub-cultures with their distinct styles, tastes and values. Belonging to a certain group and representing a certain sub-culture are significant ways for a young person to build his/her identity.

The existence of different sub-cultures and their power to construct personal identities can also be observed among small children. As Holloway and Valentine (2000) have noted, children's identities are always gendered, classed and racialised. They are always in relation to adults' identities, too. These relations are constructed in specific contexts of time and space.

There are differences between girls' and boys' cultures, at least in terms of commercial cultures. Understanding these differences and paying attention to children's own interests offer a valuable opportunity for geography teachers to become more familiar with the everyday life of their pupils, and to build links between their experiences and the contents of geography education.

4.3 Negotiations of Social Spaces in Cities

In addition to cultural identities and their fragmented nature, social spaces in urban environments are also potential opportunities for geography teachers. Urban geography in its traditional form has been closely connected to 'bird's-eye-views' of cities and is much like a previously described approach in which the environment is treated as a detached entity that can be observed and measured, but which does not have any connection to the observer's experiences. For geography education and education for sustainable development, it is crucial to connect the content of teaching and learning to learners' personal experiences; in other words, teaching must be contextualized to be effective. The dimension of the subjective environment is needed in education. In the context of urban geography, more attention should thus be paid to young people's leisure activities and the spaces where they spend their time after school.

The concept of social space is relevant when stressing the cultural dimension of ESD. It highlights the idea that different ideas, values and interests can inhabit the same space, and that a variety of sub-cultures and interest groups are constantly interacting with each other. Members of these groups must interpret the values and attitudes that other people may have. This emphasizes the importance of cultural literacy, the skills which we need in negotiating the uses of public spaces in our everyday life.

5. Conclusion

There is a need to put more emphasis on cultural issues in geography education if we wish to maintain a close connection between school geography and academic geography, with its contemporary questions. At the same time, recognizing the potential of culturally oriented geography education could also strengthen the ties between geography and education for sustainable development. In this article my aim has been to show how easily a limited view on the concept of environment can exclude subjective experiences, socially and culturally constructed environments and cultural sensitivity from environmental education. Geography, with its wide ranging views on people-environment relations, could offer essential tools to enhance culturally sensitive education for sustainable development. More attention should

thus be paid to overlapping cultural identities and their fragmented nature, as well as to the meaning that people attach to their everyday environments where these different cultures encounter each other.

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Complexities Of Environmental Education And The Role Of Teaching Geography About Sustainable Development Of Japan

Yoshiyasu Ida (Tsukuba), Saori Miyazaki (Tsukuba)

Abstract

The aim of this paper is to clarify the current position of teaching geography as part of environmental studies and also to emphasize the direction of sustainable development of Japan through teaching geography. In general, Japanese children have excellent grasp of knowledge about environment and understand to keep natural environment. But they don't try to judge how they act to solve environmental issues. In Japanese schools, geography is taught to provide general knowledge about Japan as well as the world. However, recently, some teachers attempted to introduce a change in the aim and content of the subject, and the teaching method of geography, as an alternative approach to traditional teaching geography in schools. Teaching about sustainable development through geography is the important direction of change in geographical teaching in Japan.

1. The public image of Geography in Japan

To understand the public opinion about geography, we asked a question like, Do you think that geography is important? Many Japanese people responded as "I don't know ……". They don't even recognize many geographical phenomena surrounded by them in their daily life styles. In other words, geography is too common to find the importance in their lives. The lack of understanding about geography among the public leads to a difficult situation to maintain geography as a subject in schools, and hence, leads to disappearance of geography from schools.

In Japan, the environmental education is not only taught through geography but also through other subjects, such as science. The aim of this paper is to clarify the position of geography in environmental studies and also to explore the direction of sustainable development in Japan through geographical education. The importance of geography in future environmental studies of Japan will be discussed based on results obtained from a survey, which was conducted among students and teachers. Future direction of teaching geography is also discussed by using the data collected from the survey.

The subject of geography in Japan includes regional geography, systematic geography and understanding of world issues such as environment, population and food production. This indicates that environment learning forms a part of applied geography. However, the contents of basic geographical studies include regional and systematic geography. In addition, geography is taught as an optional subject in senior high schools. Moreover, geographical education must emphasize the importance in environmental studies in Japan.

2. The image of students for environment learning

A questionnaire was prepared and distributed to students of University of Tsukuba in Japan. These students have interest on environment, and therefore, enrolled in the course of environmental education in 2006. Results indicate that 88% of students felt that the environment is getting worse, and 62% said that it is deteriorating in their neighborhood. In other words, about 40% of students haven't experienced the environmental deterioration around them.

Although they have enough knowledge about the assessment of environmental conditions, it is difficult for them to recognize or understand the global phenomenon surrounded them.

On the basis of the results of the survey, we found that 57% of the students clearly recognize the importance of environment in social studies. In Japan, geography is included as a subject in social studies in elementary and junior high schools. Moreover, the inclusion of geography as a subject in social studies has increased the understanding of the present environmental phenomena. On the other hand, the proportion of students who had studied environment under geography in the high school is only 6%, which indicates that the preference given for geography is low from the viewpoint of education for sustainable development in Japan.

In general, Japanese students think that geography is a subject that needs more memorization than other subjects. However, researchers in geography education in Japan point out the importance of geographical skills in the geography education system. In Japan, the definition of geographical skills includes two senses, narrow and broad senses. The narrow one includes the interpretation of maps (reading, writing) and skills for geographical information (data, fieldwork, presentation, etc.). The other one is the broad sense that includes geographical concept, geographic analysis and interpretation, decision making based on geography and also skills by narrow sense. Previous studies (Nishiwaki 1993, Yamaguchi 2002, Ida 2005) proposed that geography in Japan should be promoted to the level of decision making .

Japanese children have much knowledge about environment and therefore they highly concern about the natural environment. This leads to a big question in the Japanese geography education. That is, how to teach Japanese children about the reality of the environmental importance and sustainable development. The answer to the question will help the children to think about the importance of global environment including their lives, and natural and social environments, and also encourage to play an important role in their community to promote and maintain their better lives in Japan. Teaching of geography and social studies including geography should help the students to recognize the importance of environment and its relation on individual and global scales.

3. The learning process of environmental studies and geography education in Japan

The learning process of environmental studies is not only important for environment studies, but also for the geography education. In this paper, four stages of learning processes are described. The first stage is to find a theme of a study or a research topic, which is based on knowledge of environment. The second stage is to collect data for the study. The data can be collected from fieldwork or extracted from papers, books, internet, and so on. The third step is to analyze collected data and interpret the geographical aspects using maps, GIS and other geographical skills. The fourth stage is to make decisions for sustainable development based on results of the study..

The learning process above mentioned also promotes conscious of citizenship for students. But the learning process is not correctly executed due to following factors in Japan. At first, the understanding of the present world is considered as the most important part in geography education. So students have to work very hard to learn about the present condition and also knowledge of world. Obviously, it is difficult for Japanese students to look at the future world. On the other hand, it is not easy to gather knowledge of world geography because of reduced number of geographical classes in junior high schools and high schools.

In Japan, geographical skills are not considered as important by a part of teachers. It is note-worthy that geographical skills must be considered as preferences in Japan. Some teachers supported the opinion that students must learn various geographical aspects of the world to gather wider knowledge and geographical skills of narrow sense. This can be achieved in second and third stages of the learning process. However, some geography teachers and re-searchers have insisted that students should learn geography considering the skills of broad sense. In addition, students should also achieve these thorough stages from first to fourth of the learning process. These ideas and philosophies sometimes have conflicts among research-ers and teachers in Japan.

4. Opinions of high school geography teachers for geography classes

It is clear that the study of sustainable environment is one of most important contents in the study of geography. However, in reality it doesn't appear as ideal as we think. To investigate the problem, the authors carried out a research by conducting a questionnaire survey using high school geography teachers in 2007. The main aim of this questionnaire is to capture how geography teachers think about the current geography teaching in their school and what they request for future geography teaching in their school. One hundred and eighty five high school geography teachers completed the survey. The results are summarized in this section.

Table1. What is the main content of geography you wish to teach more?

Response	Percent of total population
Geographical concept and thinking	28.6
Regional geography	24.7
Systematic geography	16.2
Decision making	10.3
Geographical skills	9.8
Studying for geographical theme	6.1
Others	4.3

Table 1 shows the percentage of desired content of future geography teaching by high school geography teachers. It is clear from results that teaching geographical concept and thinking is the highest priority. In short, many geography teachers would like to promote geographical concept and thinking for their students. Decision making is supported by only 10% of the total number of teachers. These teachers tend to educate their students for citizenship. These find-ings suggest that learning geographical theme including the environmental theme is not popu-lar. There are some reasons for this unpopularity. One of the reasons is the reduced teaching time of geography. In high schools, geography is taught only in 2 or 4 units. In addition, geography is an optional subject. Teachers like to teach geography efficiently in short periods of time. They don't have enough time to teach their students about the environment. Another reason is that students do not have enough geographical knowledge to study topics concerning the environment by themselves. In other words, geography is not taught enough in elementary and junior high schools.

It is clear from Table 2 that 38% of teachers believe that that perspective and thinking is more important than geographical knowledge. Human living through geography is also important. Teachers would like to teach sustainable development for their students, because they pay

attentions to geographical perspective and citizenship. Contrary to this, high school geography teachers must teach basic geography. Moreover, many teachers won't be able to teach decision making or studies of geographical themes. They say that the basic knowledge of geography is not taught in elementary and junior high schools.

Table 2 What is the most important studying in geography you think ?

Response	Percentage of population
Geographical perspective and thinking	37.9
Geographical knowledge of Japan and world	26.3
Human living through geography (citizenship)	16.8
How to use map and geographical information	15.3
Others	3.7

5. Conclusion

Traditional learning of geography in schools in Japan includes general geographical knowledge and knowledge about the present world. Recently, some teachers attempted to alter the aim, content and methods of traditional school geography. Their aim is to emphasis training of citizenship and decision making. They introduced geographical concept as content. GIS and geography skills of broad sense are used as methods. The teaching of sustainable development will contribute to a new direction in Japanese geography. The teaching of sustainable development leads to the introduction of geographic perspective and thinking, and also makes the students think about human living in the nature, and about the human society on the earth.

Most of the geography teachers hope that more students study geography in any schools. Some geographers do agree with them. "The environment map contest" is one of the examples. This year, 2007, the 17th Children's environment map contest was held in Asahikawa, Hokkaido in Japan. Some geographers do contribute to this contest very much. This contest contributes to the promotion of sustainable development, too. Geography textbooks for high school students describe about the conservation of nature in detail. Geographers, who write the textbooks, mainly focus on students' interest in sustainable development.

One of the new directions in Japanese geography education include changes in learning and teaching geography. That is, learning geography from teacher's lecture changes to studying geography using the learning process by student's self. The studying geography in Japanese schools is changing to new a direction which helps the students to build a better society with nature. Studying sustainable development with the learning process will promote a new school geography direction of Japan in the future.

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Why Man Does Not Behave In An Environmentally Responsible Way And What Geography Education Could Do To Change This

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Abstract

Environmentally responsible behaviour cannot generally be taken for granted even if people show a highly developed environmental awareness. This statement is based on innumerable empirical studies of the earth's environmental problems and has also been confirmed by research on the gap between environmental awareness and environmental behaviour.
The reasons for this evidence derive from at least three different contexts:

- The evolutionary context: Striving for survival and, related to this, the desire for the feeling of pleasure as the highest motivational factor for action, requires as its paramount behavioural strategy egocentric, here and-now human perspectives, and as a subordinate behavioural strategy wishes and desires such as advantage, benefit, profit, success, comfort, habit, power and reputation. If they exceed a certain degree of intensity these strategies work in a way that is harmful to the environment.
- The neuropsychological context: Neuroscience states that the cognitive scope of the human brain is not sufficient to understand and anticipate the ecological complexity of the environment. Therefore people cannot react adequately. Accordingly the idea of "free will" and therefore responsibility for what we do is questioned from the neuroscientists' viewpoint.
- The situational context: This context deals, for example, with the complexity of the world/environment, inadequate knowledge, competitive interests, the relativity of values and standards and growing up in a culture of environmental degradation.

Possible preventive strategies to be discussed in geography education include: attempts to influence human behaviour towards environmentally responsible action using evolutionary behavioural strategies; punishment of environmentally damaging behaviour; proceeding from environmental behaviour to environmental awareness; educating people to act from a perspective of insight and a sense of responsibility; promoting complex and abstract thinking.

Keywords: Environmentally Responsible, Evolutionary, Neuropsychological and Situational Contexts, Strategies, Geography Education.

1. Ecologically responsible environmental behaviour is not natural

The implied premise of my talk is the maxim that the importance of ecologically responsible environmental behaviour should be *self-evident*. I assume that consensus exists in this respect and that I do not need to demonstrate here *why* environmental behaviour should be ecologically *responsible* and why this should be *self-evident*. This is as difficult to explain as it is self-evident. Even the likely last argument, "so that mankind can survive", can be questioned. This has been done, for example, by Birnbacher (1999) with his contribution "Why should man survive?" and with the question (p. 1) "*What would be so terrible if man were to become extinct?*"

I will begin by defining how I understand ecologically and environmentally responsible behaviour: This is behaviour which can guarantee every authority authorised to demand justification that it conforms to the empirical or normative laws valid in the respective environmental circumstances. Secondly it must not overtax the self-regulatory capacity of the ecosystems affected and must contribute to the preservation or restoration of the systems' balance.

Such environmental behaviour has *not* been *natural* to man in the past and continues not to be so.

This has been demonstrated for the period *since industrialisation* in overviews at the *macro-level* by authors such as Netzer (ed.1963), Goudie ([1]1981) or Nisbet (1991) as well as in the regular reports of institutions and organisations such as the Club of Rome, the World Watch Institute, the UNO or national governments. Insidious environmental damage, such as exploitative mining, anthropogenic surface warming, pollutants in the atmosphere, deforestation, the reckless consumption of resources or widespread environmental destruction through the worldwide consumption of an exponentially expanding global population, has dramatic consequences for mankind and the world as a whole. In spite of all attempts at countermeasures, self-reinforcing and therefore accelerating extensive environmental destruction since the beginning of industrialisation is now "global and total" (von Cube 1988, p. 121). As early as 1961 "The Green Charter of Mainau", presented to the German President and Chancellor, stated that "The basis of our life is endangered!" In 1975 Herbert Gruhl published his much-discussed book, "The planet is being plundered." Von Cube prophesied (1988, p. 121) "ultimately the certain death of mankind" and Verbeek (1999a, p. 97) even spoke of "a cosmic catastrophe."

The situation at the *micro-level* of individual environmental behaviour does not appear to be substantially better. As the Club of Rome remarked in 1972, "Our world system is simply not designed to accommodate such selfish, conflictive behaviour on the part of its inhabitants for much longer" (Meadows 1972, p. 171) and although empirical studies have repeatedly demonstrated that people in Germany and elsewhere do possess a high level of environmental awareness (Kuckartz 2005, p. 4; Kuckartz & Rheingans-Heintze 2006, pp. 23, 27; Matthies 2004, p. 25; Köck 2000a, pp. 66-67; 2003, pp. 28-30), the reported or observed level of actual individual environmental awareness is by no means ecologically adequate. Thus Diekmann & Preisendörfer (1992, p. 227), in their meta-analysis of 128 American studies of environmental awareness and environmental behaviour, calculate an average correlation coefficient of 0.35, and a coefficient of 0.22 in their own study. Preisendörfer's (1999) comprehensive meta-analysis of the environmental awareness and environmental behaviour of the German population produces a correlation coefficient of 0.29 for 1996, and 0.18 for 1998. Two recent studies of teaching methods in geography that only examine the relationship between environmental knowledge and attitudes to the environment, show that even in this respect the correlation is extremely weak. DeChano (2006) could not indentify a positive correlation between environmental knowledge or attitudes and behaviour in a study of 17- to 19-year-old secondary school pupils in England, Chile, Switzerland and the USA. A study by Alp et al. (2006), carried out with 6th, 8th and 10th class students in Ankara, concludes that environmental knowledge does not influence environmental behaviour, but indirectly informs behavioural intentions and attitudes. Of course empirical findings vary considerably, depending on the methodology used, the environmental issues / subject areas studied, the specificity and depth of the environmental behaviour studied, the types of environmental behaviour that are examined and the socio-demographic composition of the group studied. However, the general insight "that there are obviously massive discrepancies between general environmental awareness and environmental behaviour" is undeniable (Preisendörfer 1999, p. 74, 72-78). Accordingly a 'gap' or 'discrepancy' between environmental consciousness and environmental behaviour is widely referred to (see Braun 2004, pp. 3/4; Kaiser & Fuhrer 2000, p. 51; Klebel 2005, pp. 3, 80, 88; Kuckartz 2005, pp. 5-7; Kuckartz & Rheingans-Heintze 2006, pp. 33-70; Köck 2000a, pp. 65-71; 2003, pp. 28-36; Matthies 2004, pp. 25/26). On a very specific level, I once examined, in a small study (2000b), how much illegally dumped rubbish

could be found in the administrative districts 'Südliche Weinstraße' and Germersheim as well as in the city of Landau. Thus, in the administrative district 'Südliche Weinstraße' for example a total of 2022, 1181 and 1062 used tyres were found in the years 1994, 1996 and 1998 respectively; 264, 228 and 105 tons of general rubbish and 66, 86 and 123 refrigerators and freezers. Perhaps the 'gap' referred to above was particularly manifest among the individuals responsible for this rubbish, as in "preach water, but drink wine" or "the spirit is willing but the flesh is weak."

Now it is generally assumed that all of these environmental sins have only existed since industrialisation, whereas in *pre-industrial* and especially in *prehistoric* times man is believed to have lived in harmony with nature. However, modern knowledge proves that this is wishful thinking. Thus Diamond writes ([4]2002, p. 399): "Today we know that pre-industrial societies exterminated species, destroyed habitats and undermined the basis of their own existence for centuries." With regard to prehistoric man, Nisbet (1994, p. 122) remarks: "The idea that early man lived in harmony with nature is a romantic error, a modern version of the myth of the noble savage that was widespread in the 17th and 18th centuries. On all continents the first human inhabitants seem to have altered their environment drastically". "The 'noble savage' who didn't crush one more blade of grass than was absolutely necessary on the basis of a highly developed environmental ethics probably never existed", according to Verbeek (1999a, p. 99). The following environmental damage is now assumed or proven for pre-industrial human history (prehistory, antiquity, the Middle Ages, the pre-industrial early modern period) (see Jäger, 1994; Zirnstein 1994; Diamond [4]2002; Goudie 1994; Nisbet 1994): Soil erosion, deforestation, eradication of animal species, karst formation, creation of heathlands, uncontrolled waste disposal, water contamination, overexploitation of watercourses and water bodies, air pollution, overfishing, overgrazing, desertification, mining damage, overuse of resources etc. In comparison to the environmental damage of the industrial period, however, Diamond ([4]2002, p. 422) remarks: "The sinners are only the ones who should have known better." And although today we should certainly know better, "our generation continues whaling and clearing tropical rain forests, as if the moa had never been exterminated or pine and larch woods had never been felled. If the past was a golden age of ignorance, the present is an iron age of deliberate blindness." In agreement with Tuchman (1984, p. 13) one can also speak of the age of stupidity.

So now that I have briefly shown that *environmentally detrimental behaviour is in fact apparently natural* – and this for as long as man has existed – we must ask *why* this is so.

2. Why ecologically responsible environmental behaviour is not natural

A logical explanation for this has to begin with the ultimate motivation of human behaviour. Everything else is merely strategies for its achievement or basic conditions under which the ultimate motivation becomes manifest. Since Siegmund Freud the *pleasure principle* has been recognised as the ultimate motivation for human behaviour, i.e. striving to avoid discomfort and to achieve pleasure (P. Köck 1973, p. 97; Wuketits 1993, p. 211, 220). This psychoanalytical and evolutionary-biological thesis is also supported from a neuroscience viewpoint. According to Roth (2003), "processes of the Ego ... are embedded in subconscious processes of the limbic system", which judges everything as good/pleasant and bad/unpleasant (pp. 151, 181). Because decisions about action and the consequences of action have to be "emotionally acceptable" to the Ego, at the end of a rational weighing-up process the Ego therefore does what is evaluated emotionally as good and acceptable, i.e. what brings pleasure (pp. 162, 176; also 2006, pp. 28, 30/31). However, I would replace the narrower term *pleasure* with the term *well-being*. I see striving for, securing and increasing well-being as the ultimate motivation for human behaviour and therefore also for environmental behaviour. Von Cube (1988, pp. 125-128) had a similar view, in that he believed the principle of the least possible effort for the greatest possible pleasure was responsible for environmental destruction. Inversely,

everything causing discomfort or, in my terminology unpleasant sensations, is avoided and therefore this is what happens to environmentally responsible behaviour, which is associated with effort, renunciation, expenditure etc. Of course environmentally responsible behaviour can also provide a sense of well-being, insofar as a person can then enjoy an easy conscience and the sensation of having done something good or set a good example, etc. However, more environmentally responsible behaviour is motivated by laws and regulation or by the fear of punishment than by the sense of well-being attained through such behaviour.

Three behavioural strategies serve to achieve a sense of well-being in an environmental context.

One is *egocentricity*. According to Wuketits (1993, p. 242) "man [is] ... naturally egoistic." By pursuing and implementing self-centred interests the individual or collective Ego creates for itself a sense of well-being. Accordingly, Bosselmann (1992, pp. 338, 339) sees the origins of the ecological crisis "in the Ego structure of consciousness"; "everything else is only its symptoms." However, because the Ego lives in the here-and-now, egocentricity necessarily entails here-centricity and now-centricity as further basic environmental behavioural strategies.

Now-centricity means that the individual or group pursue their short-term, momentary interests; possible long-term negative consequences are played down, seen as abstract, insignificant aspects even though they concern future generations. Some authors even seriously ask why man should consider future generations, since we do not even know whether they will exist or not (see Birnbacher 1999).

In contrast to now-centricity, *here-centricity* ignores spatially more far-reaching perspectives of environmental thought and behaviour. It is limited to the territorial/spatial 'here' in the form of a place, a region, a state and does not feel responsible for the world beyond. And should momentary here-oriented actions still have negative results for a 'there', then they affect other people which is not particularly worrying, in accordance with the familiar 'not-in-my-back-yard' attitude.

A whole series of subordinate behavioural dispositions serves to realise egocentric and here-and-now interests. These include the following: striving for benefit, advantage, profit, success, comfort, power, respect and much more, and the more successful this is the more striving ensues.

All of the behavioural motivations and strategies listed above can be understood as evolutionary strategies for survival; they are genetic and, in principle, are present in every individual and every group of individuals. Taken on their own they are not in themselves despicable and do not cause damage when applied in moderation. This is only the case if they are so pronounced in their nature and/or intensity that the self-regulatory capacity of the affected ecosystems is exceeded and the systems thereby harmed.

Two other causal complexes are marginal conditions.

One of them has to do with man's *insufficient mental capacity* in relation to the complexity of the world. This is especially evident in the environmental context. According to Müller (1996, pp. 171/172) "environmental problems originate from effects and interaction that even scientists and environmental experts are hardly able comprehend." Insufficient ability to think in terms of cause-and-effect or non-linear dynamic processes "represents a major cognitive barrier and makes it difficult to explain accurately and recognise the environmental consequences of actions" (see also Dörner 1975; 1989; Ernst 1997; 1998; Klaus 1980; Kösters 1993). In today's world which is highly complex and dynamic in general and environmental terms as well as on a micro- and a macro-level, "our perception and thinking and the resultant ... are based on archaic structures" (Wuketits 1993, p. 59). Our perception and thinking are in an "anachronistic biotic state" (Kösters 1993, p. 356). As a product of evolutionary development, man's intellectual limitations cannot be overcome in the short-term, "because we cannot expect a merciful evolutionary leap" (Kösters 1993, p. 374). Instead, we must assume a long "mental braking distance" (Eichler 1993, p. 27).

The other causal complex has to do with the question of our *ability to take responsibility* for our behaviour and actions and thus also for our environmental behaviour. In the framework of the ongoing debate among neuroscientists, philosophers, theologians, lawyers and psychologists about the freedom of will (Geyer 2004), sparked off by a famous experiment by the neuroscientist Libet (1999; 2005), our ability to take responsibility for our actions is being questioned. This is explained by the fact that impulses for action arise unconsciously in the brain, implying that we therefore do not have rational freedom to decide. Prinz (2004, p. 22) puts it as follows: "We believe that when we act, we first decide and then act. … However, science explains our actions differently. According to science our conscious impulse to act is something like a ratification of a decision that our brain has already made: 'I want what I do', instead of 'I do what I want.'" Can we call for environmentally responsible behaviour as natural and self-evident in the face of this theory? However, in my own discussion (2006) of this issue I come to the conclusion we can of course be called to account for our environmental behaviour, and thereby find myself in good company with some of the participants in the above-mentioned debate, including Libet himself (see also Tugenhat 2007). The asserted lack of free will cannot be contemplated as an explanation or even an excuse for environmentally detrimental behaviour.

I would like to mention some further marginal conditions frequently perceived in the literature as causes, but which in reality merely represent an encouraging or discouraging framework within which behavioural motivations and strategies take effect. The most important ones include the complexity of the world, the culture of environmental destruction, the relativity of values and norms, the lack of incentives for ecologically compatible behaviour, inadequate knowledge, competing interests, situative barriers to action etc. (see Braun 2004; Köck 2000a; 2003; 2004; Kuckartz & Rheingans-Heintze 2006; Matthies 2004).

In view of the conclusions to be drawn from section 1 together with the causes presented in section 2, have geography lessons any chance of influencing environmental behaviour in the direction of responsibility?

3. The potential of geography lessons to achieve responsible environmental behaviour

The first strategy arises from the casual analysis presented above. It consists of instrumentalising the evolutionary, genetically inherited Ur-motives of human behaviour, aimed towards achieving well-being, for environmentally responsible behaviour. Accordingly it is important to ensure that environmentally responsible behaviour is not associated with the acceptance of a sense of ill-being because of any disadvantages, additional costs or effort but with a sense of well-being (see Müller 1996, p. 172; Schahn 1993, pp. 33/34). According to Preuss (1991, p. 180), "environmentally friendly behaviour" must be experienced as "convenient or pleasurable. It is essential that *environmentally friendly behaviour must prove to be directly and obviously pleasurable as a subjective experience.*" This can be achieved by establishing incentives for the desired environmental behaviour and by *rewarding* actual environmentally friendly behaviour with rewards, recognition, prestige, financial benefit, winning a trip, good marks, an announcement in the newspaper etc. (for a summary see Köck 2003, pp. 61/62). According to Preuss (1991, p. 180) the most important aspect is "immediate feedback" because immediate reinforcement is the most effective. In order to counteract the purely egocentric, here-and-now perspective, I believe it is essential to gradually expand the pupils' mental and real-life behavioural sphere to include a perspective on mankind, the future and the world. As well as positive encouragement, *negative reinforcement* of environmentally detrimental behaviour also plays a role. Here it is even more important that the consequences follow immediately – even if the ecological damage to the environment often only takes place much later (Verbeek 2002, p. 97). As the connection with detrimental environmental behaviour is then immediately obvious, the behavioural influence of negative reinforcement should be particularly effective.

In the spirit of evolutionary logic, Verbeek (2004, p. 115) has brought these two strategies together to form the following *maxim*: "*Create conditions that ensure that every actor who keeps the environmental-ethical rules personally derives more benefits than disadvantages [from this]; and [ensure] that everybody who breaks these rules experiences more disadvantages than benefits.*" Verbeek (2002) suggests money as a controlling factor. "This approach through a sort of steering tax is the only recognisably realistic one which could effect the necessary change in behaviour..." (p. 98).

Another, very *pragmatic way* is to enable situatively specific environmentally responsible behaviour and lead the pupils from their behaviour to awareness. It is thereby assumed that appropriate environmental behaviour automatically leads to reflective processes and thus to the desired environmental awareness, which in turn leads to considered environmental behaviour.

However, the ideal way, from the perspective of the theory of teaching and learning, remains the route from *awareness to behaviour and action*, i.e. action "from insight into the ecological and behavioural-ecological interconnections of our planet and our lives" (von Cube 1998, p. 128). Developing such an "ability and willingness to act by taking ecological laws into account" is the aim of *environmental education* as a whole (see Otto 1997, pp. 2, 18). Only in the context of appropriate awareness and reflection is the reduction of needs and of the external energy required for their satisfaction possible (von Cube 1988, p. 129). In this way each action acquires justification and meaning and can therefore be understood and carried out in ecological terms.

One of the two major tasks of environmental education is the best possible *cognitive qualification* (see Braun 1995, p. 70). Environmental conditions and problems are usually structured in a complex way and have a processual, dynamic character, they are complex and systemically intertwined, and are governed by laws. Environmental problems usually appear at a distance in time and space from the time and place of their causation. Because of this it is not as important to aim for the greatest possible increase in knowledge and insight as it is to develop integrated, complex, abstract, processual, prognostic and nomological thinking as an indispensable precondition for ecologically appropriate action and behaviour (Köck 2003, p. 65).

Since knowledge and skills alone do not guarantee appropriate environmental behaviour, *affective qualification* is equally important as the second major responsibility of environmental education (see also Martens 2000). Specifically this involves "developing environmentally appropriate value systems, aiming for their internalization as well as the actual direction of actions and behaviour." This should not only take place throughout young people's time at school but should begin during early childhood acculturation and socialisation (Köck 2003, p. 67). However, to ensure that young people actually act in accordance with recognised values, an attitude of 'voluntary commitment' must be developed, as has been discussed since the mid-1970s (see Der Rat von Sachverständigen 1998, pp. 26, 130/131). This voluntary commitment must be based on and led by critical 'self-reflection'. "Values and norms .... are valid on the basis of the voluntary commitment of individuals to act according to them" (Wiater 1995, p. 5). Nöldner (1984, p. 515) elevates voluntary commitment and reflection to a "*conditio sine qua non* for responsible environmental behaviour". According to Homburg & Matthies (1998, p. 182), the actual empirical success of voluntary commitment depends on the empirically proven fact that "internal control" in the context of voluntary commitment "has a stronger and more lasting influence on behaviour than external control." The highest level of development of this voluntary commitment is therefore a sort of 'ecological imperative' as formulated by Skolimowski (1981, p. 78): "Behave in such a way as to preserve and enhance the ecosystem, which is a necessary condition for further enhancement of life and consciousness."

On this basis, acceptance of responsibility is also possible in environmental action. For this means "acting in free acknowledgment of the maxims accepted as reasonable and valid in the specific context, and acting in their spirit and if necessary according to their letter, and ac-

counting [for one's actions] to every authority where necessary and accepting responsibility" (Köck 2000a, p. 91). No one can free himself of this personal responsibility by appealing to genetic behavioural determination; for recognising the significance of genes does not mean accepting "that we are ... helpless and at the mercy of our genes;" instead, it must be assumed that "we [can] in principle generate cultural 'adaptations' of the cognitive and emotive achievements of our psycho-physical apparatus by educational arrangements which can even override our genetic predispositions" (Beck 1993, p. 56). Above all, however, we possess "a genome which allows us to estimate the results of our activities (within limits) and thus we also bear responsibility (at least within limits). And we owe this to our genome. ... Even a person who does not like his genes has them anyway, and he not only has the genes that control him, but with them the responsibility and the freedom to at least try to live up to them by exercising a corresponding degree of self-control" (Verbeek 1999b, p. 162).

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Symposium Session: ESD in Curriculum and Teacher Training

ESD In Russia In The Transition To The Post-Industrial Society

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Abstract

The aim of this research is to consider the peculiarities of formation of secondary education in Russia in the country's transition from an industrial to a post-industrial (informational) development model. This transformation is realized very unevenly, thus impeding the process of transition to sustainable development.

The practice showed that in the former communist countries centralized economy was to a great extent a resources exhausting one. The economy of the Soviet Union was misbalanced to the utmost due to its fast industrialization, priority development of the primary sector to the prejudice of the high-tech branches and non-manufacturing business.

A very strong territorial unevenness of environment quality was typical for the USSR and it is also typical for present Russia because of its vast territory and relatively small population. In some regions sustainable development is just impossible. As a result, in the former USSR 2% of the territory have been lost and another 4% are now in crisis.

In Russia the transition to sustainable development is connected with difficulties as a result of transition status of economy itself, which will last for a considerable period of time.

But still the idea of sustainable development is gaining popularity, with science and education being the most important parts of the process. 10 years ago education was not even considered as a factor of sustainable development, but now it has started developing, mainly at university level. The process is going far more slowly at secondary education level. At the same time it is evident that all problems of education for sustainable development lie in geographical field and should be solved at this very level. The problem of sustainable development is an issue of relations in the "human – society – nature" system on certain territory, and only geography being a complex science of territory is capable of solving the problem.

School course of geography must give the basis of scientific concepts of relations between natural, social and economic environment. It is very important, that at post-industrialization stage the concept of sustainable development should be taught to students not only as a part or a section, but as a complex idea of the whole geography course during several academic years.

The main and the most important result of education for sustainable development is to form a generation being able to fulfill the stable development of the country.

Keywords: Education for Sustainable Development, Post-Industrial Society, Unsustainable Development in Russia, Reformation of Russian Geographical Education,

1. Russia, postindustrial society and sustainable development.

The term 'sustainable development' implies a kind of society development ensuring that the existence of the environment and society is balanced out, the balance being based on two principles: inheritance of welfare and equality of opportunities. The first principle presup-

poses that subsequent generations should have the same opportunities in the use of natural resources as the present-day generation; and the second one implies that all the countries have the right to use only proportionate amounts of natural resources. However, despite the measures taken in different countries, the situation with the environment continues to deteriorate.

In former communist countries a centralized economy showed in practice that it depletes resources to a greater extent than a market economy. Nevertheless a market economy is unable to solve the basic global environmental problems either. Over the last half a century the population of the earth has nearly doubled. 20% of the countries that entered the postindustrial development stage have accumulated 80% of the world gross product (WGP), whereas 20% of the poorest countries which are still in the preindustrial development phase possess only 1.5% of the WGP. To satisfy the increasing needs of the people the world economy has expanded over this period by almost 20 trillion dollars which couldn't but contribute to progressive depletion of natural resources. At present per capita around 20 tons of raw materials are collected and cultivated. Then with the help of the generating capacity of $2,5x10^3$ watts and 800 tons of water they are transformed into finished goods weighing 2 tons to be consumed. Of those 1 ton is wasted and the other 1 ton is a consumer durable which will eventually go to waste (Котляков, 1999). The increase in economic activity is accompanied by a gigantic rise in production, population and energy consumption as well as intensified environmental pollution. Besides, limited recourses, population increase and environmental pollution cause further instability of development.

There seems to be a natural way out of this situation: owing to economic growth ways of investing capital should be sought to solve the problem of the sustainable development. However, only 15 – 20% of the most developed countries that have embarked on postindustrial development can afford it. In this connection it appears to be premature to talk about the global transition to the sustainable development. This does not mean to say, though, that the rest of the countries should give up pursuing a strategy of sustainable development. Certain elements contributing to sustainable development should be implemented both at regional and local levels. But one should be fully aware that these are going to be only half measures; our divided society is incapable of ensuring a global sustainable development yet.

The formation of the Russian secondary education for sustainable development occurring in conditions of the country's transition from the industrial model of development to the postindustrial (informational) one is of extremely irregular nature which in turn hinders the transition to the sustainable development for Russia.

The former USSR and present-day Russia, too, is characterized by a very strong territorial irregularity in the environmental quality which is accounted for by a vast territory and comparatively sparse population. In some regions sustainable development is out of the question. As a result in the former USSR 2% of the territory is lost, another 4% is in environmentally critical condition. At the same time Russia possesses a special quality that enables the transition to sustainable development. 65% of the Russian territory which is not involved in the economic activity is a priceless treasure necessary for mankind to maintain biodiversity. Our indices of the environmental impact per territorial unit fall into the group of the safest. There is neither excessive consumption, nor overpopulation; in the 90s there was a decrease in the impact of the economy on the environment. On the other hand, 15% of the Russian territory, which is half the size of Western Europe, is environmentally dangerous. Our indices of the environmental impact per capita belong to the least favourable. (Котляков, 1999).

The transition to sustainable development in Russia is fraught with difficulty due to the fact that the country's economy is in a transition state and is likely to remain so for a considerable amount of time.

The Soviet Union's economy developed at a rapid pace for twenty years after the victory in the Second World War, afterwards the pace slowed down considerably. From 1960 to 1985 the GDP increased by about 4 times. The country held leading positions in the world in the production of many goods, mainly raw materials. Science and education experienced fast growth, with the education being noted for its high quality.

However, in the late 70s – early 80s, when in the western countries postindustrial functions were actively shaping up, the USSR continued to develop 'mechanically'. As a result, the country's industrial products became noncompetitive, and price increase for raw materials brought about accelerated development of resource industries.

The country's economy became deregulated due to a extremely high industrialization and because priority given to the primary sector to the detriment of high-technology industries and particularly the service sector. With the country being isolated, a planned economy was aimed not at obtaining finished goods but at manufacturing the basic interim products: minerals, metal, fuel, timber and so on. In view of a weak development of high-tech industries, high resource and power intensity was typical of the USSR economy. All this resulted in overdevelopment of the basic industries, which affected worst the environment. Further negative influence on the environment was exerted by the excessively developed military industrial complex.

The reforms that followed the break-up of the Soviet Union revealed the illusiveness of the Soviet economic power. Despite the Russian export quota being quite large – 18% – and the Russian export trade growing very rapidly over the past 5-6 years, commodity composition of export is typical of developing countries: by 2005 the volume of machinery and equipment (mainly defence technology) in the Russian export dropped to 5.6% compared to 21% in 1970, whereas the volume of mineral products and electric power (the amount of ore and electric power being rather small) increased over these years from 16% to 65%. While the postindustrial world preferred to export information technologies Russia exported 90% of the total output of aluminium, 80% of copper, 72% of mineral fertilisers, about 45% of crude oil, 32% of natural gas, thus reducing its finite and nonrenewable resources.

In present-day Russia the volume of energy resources export has increased even more. The rise in the world and, correspondingly, in domestic prices rendered the industrial and farming industry unprofitable. The country began to actively import industrial and farming products. The economic crisis was aggravated in the late 90s by the financial crisis.

The industrial recession continuing from 1990 till 1998 assumed colossal forms – the GDP fell by 45%. Such a slump is only comparable to the one that happed during the First World War and Civil War. Since 1999 there has been a slow production increase and to date the Russian GDP has recovered to the level of 1990.

The industrial structure of GDP has undergone radical changes. First of all, the volume of services in GDP has risen: from 36% in the USSR to 57.5%, with 68% of those involved in the service sector being economically active population. However the reason for such a change was the industrial recession rather than growth of the service sphere. So on the whole it is more appropriate to talk about regression rather than progress in the service sphere structure.

As a result there has been a dramatic fall in the standards of living of the population amid the reinforced social and property inequality. The population impoverishment was accompanied by a crisis of the entire system of social benefits, health protection, education, science. The average life expectancy for men dropped to below 60 years. The country faced extremely high depopulation, natality rates plummeted to -5 people per thousand a year. According to specialists' estimates, the way things are going, the population will have dropped to 80 mln people by 2050.

The number of multi-millionaires in Russia is on the increase. The income gap between the best-off (20%) and those citizens who earn less than the cost of living (20%) has risen by almost 5 times on 1990: the Gini index soared from 0.26 in 1989 to 0.41 in 2005. In the USA

this index is about the same (0.38) but it has to be borne in mind that the GDP in the USA is almost 10 times as big as in Russia. The most prosperous groups of Russians account for no more than 5%. The unemployment level is about 8% of the economically active population. Russia has found itself among countries with the highest level of economic inequality: large scale poverty exists alongside the richness of the few. The human development index has dropped from 0.823 to 0.795, which is not only lower than that of postindustrial countries but even the most developed among the developing ones (by 1999 the index was even lower).

The science faced and is still facing a grave crisis. If in 1990 the R&D expenses accounted for 2.9% of the GDP, in mid 90s it dropped to 0.77% (according to some data to 0.32%) and only by 2006 they rose to almost 1.5% of the GDP. It should be taken into account that the GDP itself plunged causing the R&D expenses to drop by many times (Экономика России…, 2005). In Russia the partnership between science and industry, which could have served as a source for development of a dynamic innovative economy, was never established. That is why a breakthrough of Russian scientists in the sphere of high technologies is out of the question.

The situation in case of 'modernization' of education is unsatisfactory as well. On the one hand, the state of affairs in Russian education looks fairly favourable. The number of employees holding university degrees and secondary education diplomas has reached 53%, which is one of the best figures in the world. This is the result of the rise in the number of students by 2.5 times compared with the Soviet period – over 7 mln people. It is common knowledge that over the last years the competition for places at universities has become stiffer, especially at the faculties of law, economy, management. However, the level of the education offered by universities is several times as low as that of the Soviet period, especially in commercial educational institutions.

In postindustrial countries the unqualified personnel accounts for 2-3% of the workforce. In Russia the corresponding figure does not go below 25%, with a host of young people officially holding a university degree belonging in fact to unqualified labour resources. That is why the actual number of unqualified employees in the country is far higher. The same applies to the secondary education which is compulsory. The level of school-leavers' knowledge is extremely low.

Finally, it is important to point out the role of the state which in countries that are trying to stay on the way of path dependence lays emphasis on the priority directions of technology development as well as on improving the level of education quality. Unfortunately, this is not true of Russia.

2. The prospects of transition to sustainable development for Russia

An important document was passed in the country in 1995 – "The concept of Russia's transition to the sustainable development model." The transition was meant to undergo three stages:
- the first stage: 1996 – 2000;
- the second stage: 2000 – 2015;
- the third stage: 2015 – the middle of the 21st century.

At the first some stage preparatory work was to be done which was meant to pave the way for future actions. The aim of the second was to solve the most acute ecological environmental problems. However, the majority the goals set were not attained. The goal of ensuring sustainable development does not receive all the attention it deserves in the documents by the Russian government. In them the solution of environmental problems is presented as a tactical and short-term scheme rather than a complex long-term country policy. Thus, the mention of environmental problems in official programmes of the Russian government is rather scarce.

The transition to sustainable development is hindered for Russia, first and foremost, because Russia has a long way to go before it reaches the postindustrial stage of development. Besides, the transition to sustainable development is only possible for Russia if it overcomes the

negative social, economic and environmental consequences of the growth of raw materials sector within the whole country economy. It is possible to overcome those only in case the following conditions coincide:

-reformation of the raw materials sector on the innovational technological and managerial basis;

-the use of the revenue raised from the mining operations and export of natural resources to further high-tech production processes and improve the living standards of the population;

-ensuring environmental safety of all major projects of the Russian economy that are connected with hydrocarbon raw materials entering market on a large scale.

However, as it has already been mentioned, in Russia the emphasis of the economy is first and foremost on the raw materials sector entailing depletion of natural resources, which does not satisfy the requirements of sustainable development in the unity of the economic, social and environmental aspects of stability. Therefore one cannot but agree with some Russian scientists about the "anti-stable development nature of the present-day tendencies for Russia's economic growth."

The postindustrial economy, i.e. the economy of knowledge, is properly regarded to be an alternative to the present-day environmentally unfriendly nature-exhausting policy with the emphasis on raw materials.

The sustainable development of the region involves a complex balanced out development of its three comprising elements:

-structural reconstruction of the economy;

-rationalization of the territorial pattern of regional systems of nature management;

-social stabilization of life of the population in the region.

Talking about the priority of this or that sphere is only possible in exceptional cases due to some fundamental features of the territory, for example, in case there is a unique economic, natural or social object in the region (for instance, "Norilsky Nickel" industrial complex, Lake Baikal, "Akademgorodok" in Novosibirsk.)

Summing up what has been said above, unfortunately, a sad conclusion can be made. At present Russia is a country with rather out-dated production facilities and scientific potential, enormous natural resources, an extensive internal market, insufficiently skilled workforce and a poorly developed, one-sided tertiary sector. That is why Russia's primary goal is to become a highly developed industrial power. At the same time it is premature to talk about Russia entering the "club" of postindustrial countries.

At the same time it is very important to remember that as early as in 1964 a major Soviet geographer D. Armand worked out a concept of "the rational (proper) nature management" (Арманд, 1964). In fact, it was a manifesto of proper nature management as an alternative to squandering and neglect of nature which had become standard practice by that time. The book by D.Armand "For Us and Our Grandchildren" in a conceptual way is very close and even identical to the famous Brundtland Commission's Report "Our Common Future". The book finishes with the words "It is a moral obligation of every generation to leave for the subsequent one the natural resources in a better condition and in greater amount than it has received from the preceding one." It is not difficult to see that these words practically coincide in their sentiment and content with the famous words from Brundtland's Report. Therefore we have the right to consider that the ideas of sustainable development were formed and developed in the Soviet Union; it is another matter that in view of the conservative thinking of Soviet bureaucrats these ideas were not widely disseminated (Касимов et al, 2003).

3. Sustainable development and geography education.

Given the increasingly growing tendency across the world to split into postindustrial countries and the rest, the need for the transition to sustainable development in the face of globalization, the geography education calls for a drastic reformation.

Geography is the only school subject that provides complex knowledge in both the social and physical spheres. The ultimate 'responsibility' for educating citizens of Russia under the new conditions rests with geography. However, the present geography course tends to reflect the situation in the world and Russia that used to exist 30 – 40 years ago.

Geography education needs reforming in two basic directions:
- reformation of the structure of geography education;
- reformation of the actual content of geography education.

While reforming the *content structure* it is essential to proceed from the fact of globalization and the fact of postindustrial transformation in the most developed countries. These two motives must pervade the entire geography course. It has to be demonstrated that globalization itself is an objective process which is impossible to stop. In this regard it is necessary to make the youth realize that globalization is deprived of a negative potential and antiglobalists' protests are caused by a lack of knowledge.

At the same time a postindustrial transformation is also an objective process occurring at the backdrop of globalization. But as distinct from globalization, postindustrialization inevitably leads to social stratification in terms of the amount of income, giving rise to an elitist, intellectual class involved in the production and consumption of knowledge and information and a 'lower' class engaged in monotonous labour and pursuing purely economic ends.

An important thing to be done concerning the change in the content is to 'turn' the entire geography course so that it faces the environmental problems, sustainable development in the context of postindustrial transformation. And, finally, onto the last point which is the integration of study of Russia into the geography course. The problems faced by Russia should run through the whole course.

While reforming *the content of education* school children should master the basic notions of globalization, postindustrialization and sustainable development. The geography course should present in greater detail the theory of postindustrialism, show the dynamics of development of industrial structure of economy in the most developed countries of the world, reveal the special character of industrial differentiation of the service sector. It is necessary to show more deeply the decisive role of the science, education, information in the society development; the influence they produce on both the country's economy, social and economic level of the population as a whole and on the living standard of each particular person. It is of great importance that schoolchildren should understand that their future depends solely on them, their eagerness, education level, intellectual potential: whether they will be members of an elitist society with high income rates or will remain on its periphery.

A schoolchild must learn the territorial inequality of the postindustrialization process on both the global and national levels. Students are to be aware about Russia's present stage of development. The expanding service sphere needs to be considered in detail, but it is very important to stress its imbalance due to the excessive development of trade, public eating, entertainment industry on the one hand, and, on the other, because the education and information sphere are lagging behind. The irregularity of the process in terms of the territory it covers must be demonstrated.

And, finally, the issue of the environment condition and preservation, the problem of sustainable development must be highlighted within the content of geography education with postindustrialization underway. It is important to show that sustainable growth on a global scale is a crucial but rather illusionary task at the present stage owing to, first of all, the territorial division of the world into postindustrial and industrial (and even preindustrial). At the same time

certain elements in the direction of sustainable development can and must be implemented at national and regional levels in every country.

In particular, the geography education for sustainable development plays the central role for Russia. It is important to show students that the overly developed basic branches of heavy industry have produced a strong negative impact on the environment. At the same time the territorial pattern of enterprises harmful to the environment is extremely uneven in this country due to the vast territory and low density of population. It is important to 'direct' the content of the education towards revealing the basic reasons for the environmentally unfavourable situation in Russia and towards finding ways of eliminating it:

- the industry is still extractive and military and includes a lot of resource, energy and labour intensive sectors;

- scientific and technological potential remains at the level of the 60s – 70s, i.e. is characteristic of the period of "dirty" industry;

- the degree of wear of material and technical equipment in the industry, the level of efficiency of treatment plants is low, which increases the risk of accidents leading to great environmental disasters;

- the use of the territory, especially in agriculture, is inefficient and environmentally unjustifiable;

- reducing resource consumption;

- minimizing man's environmental impact;

- improving production standards and ecological culture of the population;

- extending scientific developments and research in the field of environmentally efficient sectors.

It is of importance that students should learn the truth that the key to sustainable development lies in a complex improvement of the nature, economy and society management both at national and local levels.

Nevertheless, the concept of sustainable development slowly but surely finds its way, with science and education playing the leading role in this process. While around 10 years ago there was no issue of education for sustainable development, nowadays this trend is developing first of all at a university level (Касимов, Романова, 1999). At the end of 2002 Moscow State University hosted the first meeting in Russia, inspired by the faculties of Geography and Economy, on the issue of higher education for sustainable development which was attended by representatives of different universities. The meeting was designed to define the role and place of education for sustainable development in Russia and to outline the ways to integrate it into the university curriculum.

Within the secondary education the pace of the process is far slower. Still in 2004 a conference for universities was held titled "The 21st century teacher: sustainable development and geography education" inspired by Moscow City Pedagogical University. The main goal of the conference was to stimulate studies of sustainable development problems within the secondary education of Russia and to define the role played by geography education in this process. At the conference an idea was stressed that all the difficulties associated with education for sustainable development lie in the field of geography and have to be tackled at this level. The problem of sustainable development is that of interrelations within the system of "man – society – environment" on a given territory and only geography, being a complex science of territory, is capable of solving it. (Родзевич, 2005).

The school geography course must give insight into scientific notion about connections and interaction between the environmental, social and economic spheres. It is of utmost importance that the concept of sustainable development in the face of postindustrialization should be presented as an idea pervading the entire geography course throughout several years of study rather than as a separate block or unit.

It is worth mentioning specially the role of the main magazine highlighting the problems of geography education in Russia. This is "Geography and ecology at the school of the 21st century." The magazine provides the main channel for ideas of Russia's sustainable development and ideas about education in the area of sustainable development. It should be pointed out that the summaries of the main articles are given in English.

The major result of education for sustainable development is a generation that is capable of making sustainable development real for its country.

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Implementation Of The Concept Of Education For Sustainable Development Within The Professional Retraining System

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Abstract

The education for sustainable development envisages a transition to a people- and economy-oriented model of education, which should rest on interdisciplinary knowledge that is based on a comprehensive approach to the development of the society, economy, and environment. Russia possesses a great potential for successful implementation of the concept of education for sustainable development. Despite all the achievements in the area of new computer technologies, the teacher still remains a central figure in the current educational process.

Keywords: Sustainable Development, Modernization of the Education, System of Professional Retraining, Socio-Cultural Approach

1. Aspect of the education in the interests of sustainable development

Unlike any other academic concept, the notion of sustainable development has become a high-profile issue and has been in the limelight of the world economy, the environmentalists, and the education sector.

To achieve the sustainable development, Russia needs to maintain a high level and quality of education, it should be modernized in line with the ongoing changes in the national science, technology, social sphere, and economy. The environmental education is playing a key role in the implementation of the sustainable development concept within the Russian educational system. The education for sustainable development envisages a transition to a people- and economy-oriented model of education, which should rest on interdisciplinary knowledge that is based on a comprehensive approach to the development of the society, economy, and environment.

The unique feature of the education for sustainable development lies in the fact that the education of this type "does not present a special "vertically" arranged system of education, as are, for instance, the chemical, biological, geographical, economic and other systems of education" (Н.С.Касимов, 2006).

The education in the interests of sustainable development is a methodology designed to create the education of new type; this is a new form of education that would actually embrace all the data domains of natural sciences, humanities, and technical sciences.
Russia possesses a great potential for successful implementation of the concept of education for sustainable development. First textbooks have been published and elective courses prepared. The Moscow Education Department is planning to incorporate the course "Environment and Sustainable Development" (for the 10th grades) into the curriculum. This would create a serious problem - who and how would teach this new high-priority course?

2. System of professional retraining

Despite all the achievements in the area of new computer technologies, the teacher still remains a central figure in the current educational process. Therefore, the system of teachers' retraining should be viewed as innovation in the existing education situation. For this purpose, the institute has developed and successfully implemented special programs.

Modernization as a socio-cultural phenomenon and a controlled process emerges in the conditions of self-saturation of a system, as a phenomenon which eliminates risk situations and can be viewed as a crisis management phenomenon (Э. Д. Днепров, 2005). Modernization can be characterized by the following features:
- dynamism;
- evolution ability;
- adaptability to the continuously complicating world;
- functional differentiation which leads to finer specialization of roles inside the system as well as functional and role-related cohesion during the interaction of structures;
- self-organization.

Baring in mind the characteristic features of postindustrial society, such as dominance of values over goals, growing importance of scientific knowledge and superiority of creative man and at the same time intermediary, it is necessary to organize both the educational institution and the educational process taking into account all of these factors, as well as considering the fact that education is an innovation with a long life cycle combining linearity and non-linearity of development and functioning.

2.1 Implementation of socio-cultural approach

Educational process in educational institutions serves as an indicator of how efficiently tasks are solved in such areas as education, upbringing, development and professional retraining. It also determines the strategy, tactics and quality of modernization. It is quite obvious that the system of professional retraining itself serves as such an indicator (being both an innovation and a product of socio-cultural modernization) and for its successful development it needs a sufficiently stable methodological basis, such as socio-cultural approach which allows to combine social and individual factors within the educational process. Implementation of socio-cultural approach in the framework of constructing and conducting the educational process requires using the following principles as a basis (Н.И.Яковлева, 2006):
- principle of value and anthropological approach of the educational process;
- logical and didactic principles in education which target deeper scientific approach towards education (targeting general scientific methods and approaches, functions of scientific knowledge, and dialogue);
- principle of self-cognition in the context of socio-cultural reflection of students;
- principle of subject orientation in the construction of the educational trajectory;
- principle of anticipatory education.

Content of education should be considered in the unity of composition and activity on its acquisition as a value-targeting system filled with three models of content of education: classical, alternative and dynamic, being interrelated within the framework (and in the system of) professional retraining. Highlighting the leading problem in the content of educational curriculum in every course is not only a principle of education but also a factor which allows one to be informed of the new problems of education, and to correct the content of curricula in accordance with

socio-cultural dynamics. In accordance with the current problems of modernization, the require-ment to deepen differentiation in the content of education becomes one of the leading ones within the process of creating professional educational programs, thus reflecting socio-cultural tenden-cies towards the differentiation and specialization of professions, as well as the requirements of professional competency.

Efficiency of implementation of the content of education depends on conditions and technologies used within the educational process which are also characterized by socio-cultural functions, such as informative, problematic and organizing (self-organizing ones). The most important condition of efficiency of use of any technology in the educational process of professional retraining is it being adequate to the content of material studied, as well as to the total of indicators of the model of the economy human being (human being in education), and conformity with the socio-cultural principles of organization of the educational process in the system of professional retraining. Didactical meaning of educational technologies can be enlarged up to socio-cultural one thanks to the usage of humanitarian scenarios/technologies, such as *Choice*, *Dialogue*, *Asso-ciations* and *Compositions*, *Theatre* and *Project*.

Development of the educational system is regularly and inevitably connected with renewal and innovation of the content of education. In the system of Additional Professional Education which includes advanced vocational training and professional retraining, the system of profes-sional retraining can have the function of the internal (intrasystem) experimental grounds for trying out content-educational innovations which could be promptly introduced into the system of professional retraining. The content-educational innovations are usually represented as the con-tent which is most topical for the educational situation and the learners and meets the needs and requirements of the society and the individual. The most important organizational and pedagogi-cal conditions which influence the quality of education in the system of professional retraining are resources necessary for the educational process, the additional professional education institution being in demand, and feedback to the environment.

2.2 Modernization of educational process management within the system of professional retraining

The concept of managing educational process within the system of professional retrain-ing of personnel takes into consideration socio-cultural character of modernization, edu-cation and a human being (Н.И.Яковлева, 2005). Their mutual basis is formed by evo-lution ability, axiological character and development through interaction (dialogue). At the basis of the concept of modernization of educational process management within the system of professional retraining of personnel lie the following principles:
- principle of continuity/evolution ability of the development of the system of professional retraining of personnel;
- principle of spirituality, correspondence to culture, value of a human being and education as well as the educational activity;
- principle of value system of management;
- principle of taking into account the interrelation, interaction and interdepend-ence of linearity and nonlinearity of development, when the trajectory of the linear development is corrected by multilevel outbreaks of innovation proc-esses (epoch-making, basic, average and improving);
- principle of increasing of the role of scientific and systematic, as well as conceptual knowledge in all areas of human activity;
- principle of the leading role of anticipation and prediction in the decision-making process at all levels of management viewed as a value-coordinated and purposeful system; hence the following two principles:

- principle of expanding of intercultural interaction and cooperation;
- principle of promoting of scientific-based management;
- principle of socio-cultural management (based on such humanitarian scenarios as *Choice*, *Dialogue*, and *Project*; use of scenario planning based on humanitarian scenarios as technologies; management as a choice, dialogue and a project);
- principle of considering the evolution ability of the development of education (educational system and educational process).

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Sustainability, Curriculum Development And Kaupapa Maori

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Abstract

New Zealand is currently (2006-2007) evaluating a new national secondary school curriculum. In the eight levels of the draft curriculum, issues of sustainability emerge explicitly at level five in the Social Sciences Essential Learning Area (ELA), with the Sciences ELA also providing curriculum space for environmental teaching and learning. With reference to teaching and learning about sustainability the more significant statements, however, are those relating to the design of integrated school curricula. Here the emphasis is placed squarely on school-based curriculum design processes. In this part of the draft curriculum, sustainability is one of the few areas nominated for integrating learning across the five key competencies identified in the draft curriculum statement.

In this presentation I discuss the options that are being created for the development of school-based curricula in local contexts. Specifically, the focus is on schools that develop curricula that use *Kaupapa Maori* (the principles and practices of Maori people), given the importance attached to sustainable use of the environment in Maori culture. I argue that the synergy of combining a new school-based curriculum development process with a commitment to explore Maori approaches to environmental sustainability provides an opportunity for new teaching and learning approaches.

The inevitable caveat relates to the commitment to and resourcing of curriculum development. The draft curriculum document replaces existing curriculum statements in subject areas with a more open framework encouraging school-based negotiation. Promoting this more open approach will require investment of time and effort from a diverse cohort of teachers. I argue that professional development opportunities need to be put in place alongside curriculum statements if issues like sustainability are to be addressed, and that this remains as a challenge yet to be accepted by the New Zealand Ministry of Education.

Keywords: School-based Curricula, Environment, Sustainability, Maori, Local Initiative, Professional Development.

1. Defining curriculum spaces for Education for Sustainable Development (ESD) in Aotearoa/New Zealand

In July, 2006, the *New Zealand Curriculum: Draft for Consultation* (NZCDC) was published by the New Zealand Ministry of Education (2006). This 34 page document is the basis for a proposed national curriculum, within which education for sustainable development will be embedded. For Geography, this slim volume will replace the 31 page *Syllabus for Schools: Geography Forms 5-7* (Ministry of Education, 1992), the 58 page *Social Studies Curriculum* (Ministry of Education, 1997), and many other primary documents, as the draft curriculum consolidates 'subjects' into 'learning areas'.

Geographic education will now be found in the Social Sciences 'strand' called *Place and Environment* and in the Science strand named *Planet Earth and Beyond.* Geography is no

longer named as a cannon subject; familiar curriculum labels such as Physics, History and French have also disappeared from the draft NZCDC statement. Each learning area now has an 'essence statement' that explains the nature of the strand.

> Social Sciences: In the *Place and Environment* strand, students learn about how people perceive, represent, interpret and interact with places and environments. They come to understand the relationships that exist between people and the environment.

> Science: *Planet Earth and Beyond*. This strand is about the cyclic processes and systems that occur on Earth and in space and the interactions between them, particularly in relation to New Zealand. These systems provide the conditions for life. Life forms, especially humans, impact on them both positively and negatively. Students need to know and understand these processes and to appreciate that modifying them affects all living things.

The breadth of these essence statements allow, but do not require ESD, and to get such options implemented in the classroom, we need to look further at the intent of statements about processes of curriculum development. So, where does ESD belong in the new curriculum framework proposed for Aotearoa/ New Zealand? Geography, as a traditional 'home' for the teaching of sustainable development curriculum will be offered across the curriculum, from Level one to Level eight (year 1 to year 13), and the best options for ESD curricula are therefore in either/both *Place and Environment* or *Planet Earth and Beyond.*

While the proposal to restructure the curriculum was signalled well in advance, with a lengthy period of consultation, a much more radical proposal is introduced on page 26 of the NZCDC. *Designing a School Curriculum* promotes school based curriculum, where schools may organise learning programmes "that integrate understandings, key competencies and values across a number of learning areas". As the first of five 'themes' identified in the NZCDC, the school-based teaching of sustainability is described as follows:

> Sustainability: students investigate the long term impact of social, scientific, technological, economic or political practices and consider alternatives that might provide more durable for the economy, for society, and for the environment. (New Zealand Ministry of Education, 2006, 26).

The distinction between sustainability and sustainable development is noted. The anthropocentric nature of the Brundtland Commission's text ("meets the needs of the present without compromising the ability of future generations to meet their own needs.") should not be considered problematic; neither should the use of the word development. However, the critique that focuses on the co-option of the term sustainable development (eg. Scott and Gough, 2003; Springett, 2003) should also be acknowledged in ESD curriculum development in Aotearoa/New Zealand.

Maori, who have a cultural commitment to the use of natural resources and a renewed interest in developing teaching programmes in *te reo* (Maori lnguage) that are consistent with Maori principles and practices, are well served by NZCDC. Concerns about the failure to deliver a companion document in *te reo* and based entirely on *kaupapa Maori* may be modified where options for school-based curricula in thematic areas of ESD are available. The following paragraphs document key sustainability concepts within *kaupapa Maori* and explore some of the options that could be developed in ESD with Maori learners.

2. Maori approaches to education

At the time of European colonial expansion into *Aotearoa* (Treaty of Waitangi, 1840), the relations between Maori and the physical environment were well articulated. There have been debates about the role of Maori and the first settlers in the transformation of the physical environment (Cumberland, 1962), but equally there have been historical assessments that underscore the controls that existed on Maori use of the environment and the eco-sensitive principles that underscored these practices (Dieffenbaker, 1843; von Hochstetter, 1867).

Nineteenth Century environmental 'education' within the Maori world has a history as well. Smith and Smith (1993) make the point that prior to the imposition of a colonial educational structure there is clear evidence of a vibrant Maori *ako* (educational process or pedagogy) that insured the transmission of Maori knowledges. There were pedagogic relationships that operated between people at the *whanau* (family) and *hapu* (larger group) levels. The core issues of environmental education, those of identity and belonging were embedded in *whakapapa* (family history) that informed Maori of familial and genealogical relationships with the spiritual realm and natural environment. There was no national 'curriculum'; rather a set of principles and practices that were (and are) sensitive to the particular place, its bio-physical characteristics and their *mauri* (life force).

The secular provision of education for Maori was initiated with the Native Schools Act in 1867; environmental education was not a significant aspect of these programmes. A century of colonial education was established, and there was little scope within this system for *kaupapa Maori* or *te reo Maori* that underpinned Maori environmental education. By the late 1980s, the failure of colonial and assimilationist education to serve Maori children became clearer. On almost every index the 1971 *Education of Maori Children: A Review* had shown that Maori children were not reaching the goals designated by the system. Section 155 of the 1989 Education Act addressed the issues when it stated that *Kura Kaupapa Maori* (immersion schools taught in *te Reo Maori*) could be established. This Act may be recognised formally as a post-colonial marker; Maori had the option of creating (environmental) education that used *te reo* (the authentic voice of Maori), involved the community, and was relevant to the place in which it was offered. The foundations for Maori ESD were put in place.

3. Key components of Maori environmental learning and practice

Kaupapa Maori provides a framework for education in sustainable development. Within Kaupapa Maori, environmental awareness has a distinctive cosmological base that:

> "Taken as a whole, … provides an interesting contrast to the creation myths from other lands, for it gives an insight into the Maori world view and, in particular, to the richness in Maori thought to the personification in nature" (Reed, 2004, 2).

The central elements are the roles of *Ranginui* (the sky father) and *Papatuanuku* (the Earth mother) and a pantheon of familial *atua* (gods) associated with environments and processes associated with them. For Maori, the Earth and the sky and everything in between are considered *tapu* (sacred). To remove the *tapu* so *whenua* (land) can be used to grow food, *karakia* (prayers) and other activities are performed routinely to make the land *noa* (common). These practices are comfortable and familial rituals in Maori teaching and learning environments, and underpin my argument that *kaupapa Maori* provides a base for ESD.

An effective demonstration of this can be found in Greensill, Greensill and Chalmers (forthcoming) where a school based curricula in a local school uses kaupapa Maori to deliver a programme featuring gardening and stabilizing of beach dune system. In the ESD teaching

programme that uses food growing as a context, supplications to appropriate deities are intro-duced. Maori children learn of inter-relatedness of everything through *whanaungatanga,* a process of reciprocal and respectful awareness between people and the flora and fauna of the natural world. These practices are embedded in *kaitiakitanga* (the practice of environmental stewardship) that ensures that the natural world is maintained in a condition that insures the sustainable existence of future generations.

In *Kaupapa Maori* there are a number of ways that the *mauri* (life force) of plants, and other things in the environment are maintained; *rahui* is a time where harvesting may be restricted, *te wa whakatipu* is the time set aside for crops to grow. These concepts are introduced and reinforced during the environmental education programs in *te kura kaupapa Maori* (schools using Maori language and culture as a base for teaching and learning).

4. An exemplar ESD programme using Kaupapa Maori

Greensill, Greensill and Chalmers (forthcoming) focus on both pre-school and formal educa-tion at *Te Kura o te Rohe o Whaingaroa,* the Raglan District High School. Raglan is a small (just over 2500 people in the 2001 Census) town on the west coast of the North Island of New Zealand. Nearly 30% of the population self identified as Maori in the 2001 Census, and the importance of local *hapu* in the history and community development is well documented (Chalmers and Greensill, 2006).

Formal education for all children begins at age 5. Raglan has an 'area' school that caters for about 460 students in year 1 to year 13. *Te Roopu Aroha ki te Reo*, a Maori language unit was established at Raglan Area School in 1989 with approximately 20 children in years 1-4. When numbers justified a language immersion appointment for a year 1 to year 8 programme (in 1992) a Maori teacher was appointed to develop the programme, and local support led to another appointment and a designated space in 1994. A joint community-Ministry of Educa-tion facility, *Te Puawaitanga* was built in 2002, and the number of learners in year 1 to year 12 programmes now exceeds 80 with a teaching staff of four. While *te Roopu Aroha ki te Reo* has four teacher equivalents, ESD programmes are designed and implemented as part of a cross curriculum programme. Across the curriculum, the language of instruction is Maori, but the learners are bilingual and capable of receiving instruction and responding in English.

Maori as the language if instruction is the practice throughout the Unit, and it is well illus-trated in the year 5 classroom. The room is light, with colourful and extensive graphics in *te reo*. The learning environment has documented graphics illustrating lunar planting and fishing calendars that underpin sustainable harvesting. The lessons meet authenticity criteria in a number of ways; they are expressed in *te reo*, and relate to the local place in terms of plant and animal species. Even more important, they have the support of the local Maori community, and they have practical application outside the classroom.

The practical work involves activities on tribal land within walking distance of the school. The focus is food production and harvesting in a community garden of about 2000sq metres. The teacher draws on community support, most notably *kaumatua* (respected elders) with many years of experience in the local environment. The *kaumatua* both demonstrates and teaches sustainable practice in the garden, with young people given the chance to learn Maori names and products with reference to cultural practices in the local environment. When plants with limited food value but medicinal benefits are encountered, these are also drawn to the attention of the young gardeners.

5. The future and environmental education using *kaupapa Maori*

The developments at *Te Kura o te Rohe o Whaingaroa* are one example where learners can explore the issues of sustainability with reference to Maori language and culture. The principles of *kaitiakitanga* and practices such as *rahui* and managed harvesting seem foundational to children's learning about sustainability. They see the issues of sustainability through real and immediate reference to the local environment. The development of the teaching programme took place without knowledge of the emerging NZCDC proposals, but in a manner consistent with the current design; developed by local teachers with reference to the community, it reaches across the curriculum, is mandated within the school, and it explores universal principles through locally based experience. The model exemplified at *Te Kura o te Rohe o Whaingaroa* has much to offer for the wider educational community.

The current curriculum statement allows and values the importance of *kaupapa Maori*, but it implementation is still rather distant. Even more long term will be the context rich teaching of ESD and moves away from "prescribed common topics" with nationally administered formal examinations in narrowly defined topics. The option of *Te Marautanga o Aotearoa* (a curriculum statement for education in the Maori medium) is under discussion (Ministry of Education, 2006, 7), but the prospect of teaching and learning experiences such as those in place at *Te Roopu Aroha ki te Reo* being widely promoted is hard to foresee. While the Ministry of Education statement allows interdisciplinary teaching of sustainability, there are two significant impediments that seem almost insurmountable.

The first operates at the level of school based curricula. The negotiation process about thematic teaching across the essential learning areas is a matter of concern. Thematic topics like sustainability, citizenship, enterprise, globalisation and critical (financial) literacies are required to be negotiated by "school trustees, principals, teachers … with students and other members of the school community" (Ministry of Education 2006, 26). While this is entirely appropriate, I suggest that the time and commitment required for this process will unnerve almost all but the most ardent advocate of ESD.

The second set of issues relate to national concerns. The emphasis on formal qualifications and the National Certificate of Educational Achievement remains focused on examinations against specified standards. Teachers are intensely aware, and (informally) evaluated against student performance in these highly nuanced standards, and they are a cohort with wonderful experience in teaching in somewhat traditional canon subjects. The Ministry might explore what it would take to convert this system to one that could effectively develop ESD for learners. My feeling is that the development of exemplary resources in just one area of thematic curriculum development, and the attendant training of a cohort of teachers able to promote and deliver this curriculum would require more resources than the Ministry could commit, even through a redesigned on-line community of practice approach.

In conclusion, we will continue to find excellent exemplars of ESD in Aotearoa/New Zealand, particularly those using approaches supported by *Kaupapa Maori*. There will also be a few places where contemporary curriculum development could generate new school based initiatives, but the overall prospect for effective thematic ESD is modest in the short term.

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Education For Life Through Problem-Based Learning: Re-Designing The Geography Curriculum For Sustainable Development – A Case Study Of A Secondary School In Singapore

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Abstract

An initiative in Singapore's education, Teach Less, Learn More (TLLM), is about teaching better to engage our learners and prepare them for life. Many schools in Singapore have begun their journey in redesigning and customising their curriculum to best prepare their students for the future.

The author will showcase a problem-based learning geographical experience created for the Secondary Three students. The programme, "Education For Life", aims to achieve the learning outcomes of engaging the students in real world problem solving, developing self-directed inquirers and achieving personal mastery. The collaborative effort of the teachers of the school is seen in the differentiated resources they had created for this programme. The students were given different resources and different scenarios to work with, according to their different ability levels.

The context for this problem-based learning experience was set in the real world – the tropical rainforests of West Malaysia. It is within this geographical context that the students planned, assigned work, made observations, gathered data and arrived at certain conclusions.

The paper examines how the students were taught the problem-based approach in asking questions, checking out possibilities, finding out facts and applying them to solve the crafted problem. The problem was about fulfilling a performance task of increasing an awareness of the people in such environments. The output was to design a service-learning project to address some needs of the community living in the forest and nearby plantation.

This Education For Life programme is about learning the skills that can be carried over and sustained through life.

1. Introduction

The objective of this paper is to showcase a problem-based learning geographical experience created by the teachers for the Secondary Three students (aged 15) in response to the Teach Less, Learn More (TLLM) initiative in Singapore. TLLM is all about teaching better to engage our learners and prepare them for life, rather than teaching more for tests and examinations. TLLM aims to touch the hearts and engage the minds of our learners to be life-long learners with resilience to face the challenges of the world of today.

This would then mean asking ourselves why we teach, what we teach and how we teach (Ministry of Education, 2005). It also means the focus of our education is now shifting from quantity to quality. Quality is in terms of classroom interactions, opportunities for expression, learning of life skills and character building through innovative and effective teaching approaches and strategies.

With this as the backdrop, schools are re-looking at their curriculum, pedagogies and practices and re-designing and customising their curriculum to best prepare their students for the challenges of the world.

2. Background

CHIJ St Theresa's Convent is an all-girls' Catholic secondary school in Singapore. It is one of the thirteen schools in South 4 Cluster. The school takes great pride in preparing the students for its annual Education For Life (EFL) Programme. The EFL programme which started as early as 1991 aimed at providing opportunities to bring students out of the classrooms on field trips. From mere field trips, the programme escalated to more meaningful learning journeys and adventure camps. In response to the recent Teach Less Learn More initiative, the school started to customise part of its Secondary Three Geography curriculum and integrated it with Service Learning and Character Development for this year's EFL programme.

The objectives of this programme are for the students to explore the world beyond the classroom, to make connections between theory and reality, to engage in real world problem solving, to develop self-directed inquiry and life-long learning skills, to appreciate the importance and beauty of the natural world and to overcome obstacles and challenges through personal mastery.

Embedded in the many objectives above are some fundamentals of Geography education in providing a holistic understanding of physical-human relationships, developing an informed concern about the quality of the environment and the future of the human habitat and the desirability of sustainable development at local, regional and global scales (Singapore Examination and Assessment Board, 2007).

3. Education For Life Programme 2007

In the Singapore's secondary school Geography syllabus, Natural Vegetation includes the study of the Tropical Rain Forests; its distribution and characteristics, its adaptation to the environment, its uses and the challenges and problems of deforestation. Hence, it was befitting that the Education For Life (EFL) programme for the school in March 2007 was based in Taman Negara, West Malaysia. It is Malaysia's National Park and has one of the oldest rainforests in the world. It is said to be 130 million years old. Today, it covers a total of 4 343 sq kilometres, seven times the size of Singapore.

Instead of learning about the tropical rain forests within the confines of the classroom, the whole cohort of two hundred and fifty 15-year old Secondary Three students went on an experiential learning journey to the forests of West Malaysia, learning more about the forests, a nearby plantation and the community of people there.

It is within this geographical context that students ventured into learning for life. Posed with a real world problem, they used the Problem-Based Learning (PBL) approach to surface an awareness of conservation of the environment and the improvement of the quality of life for the people living in those environments, the interdependence of global communities and how young people can contribute through their service learning projects.

Although the whole cohort of students went to the same site, Taman Negara, they were given different performance tasks differentiated according to their abilities. The students came from three different courses – the Express (Exp) course, the Normal Academic (NA) course and the Normal Technical (NT) course. The materials and tasks were prepared by a group of teachers who compiled them into customised EFL booklets for the students of the three different courses.

The theme for this year's programme was "Learn to Lead, Lead to Serve". In the booklets, were sections that spelt out My Objectives of the programme, Rules and Attitudes, Steps and Stages of the Problem-Based Learning (PBL) process, Group Contract, information on Service Learning, Data Collection, geographical information on developed and less developed countries, Journal pages and more importantly the crafted problems posed to the three different groups: the Express, Normal Academic and the Normal Technical.

4. Problem-Based Learning Tasks

4.1 The Problem crafted for the Express classes

Your journey on the Education For Life (EFL) programme has brought you to the sights and lives of those living on the plantation in a less developed country as well as the protected flora and fauna of the oldest rainforests in the world. As a young person who has grown up in a developed country and a Theresian student who is part of the CHIJ (Convent of the Holy Infant Jesus) schools' tradition of service-learning, you have been asked to think about ways in which you can help the country you have visited.

Learning from this trip to one of the world's rainforests (Taman Negara) and Tekam Plantation in West Malaysia, you are to design a service-learning (S-L) project that would address one area of need in these communities. Your service project must fulfil the following criteria:

- It should be in line with the goals to be achieved in the UN Millenium Declaration
- It should ideally help members of the community at Tekam Plantation and Taman Negara to improve their quality of life or conserve customs and the environment (you may help the community at the cave complex if you are able to identify an area of need there)
- It should aim towards raising the standards of living whilst managing the proposed development.
- It should enable the people at Taman Negara and/or Tekam Plantation to utilise the resources ably and without causing severe damage to the environment.
- It should focus on one of the principles in the National Education Messages.
- It should be practical for implementation (feasible for adoption and execution ie able to be carried out).
- It should also be a project that is feasible to be carried out by young people aged between 14 and 25 as a contribution to the advancement and progress of less developed countries.
- Its benefits for the community should foster a desire for continued service-learning projects/relations between the developed and less developed countries.

At the end of the unit in Term 2, you will recommend your service-learning project as an appropriate form of aid and justify how your project will not just help the park and people but also become a way for the young people from the developed countries to take on a more active role in the less developed countries. You will recommend how your project will promote appropriate action by the developed countries to use their resources to conserve and preserve and enhance (improve) the quality of life in the less developed countries.

4.2 The Problem crafted for the Normal Academic classes

Your journey on the Education For Life (EFL) programme has brought you to the sights and lives of those living on the plantation in a less developed country as well as the protected flora

and fauna of the oldest rainforests in the world. As a young person who has grown up in a developed country, what can you do to help the less developed country you have visited?

As a young person who has enjoyed the benefits of living in a developed country, you have to make other people aware of the need for the developed countries to take part in the service projects to help the less developed countries. You have to mount an advertising campaign to show the need for rich countries to help the poor nations. Your school has emphasised the importance of service learning.

You would need a medium (means) to capture the attention and agreement of the developed world to convince them that the richer nations have a role to play in the conservation and preservation of the environment and in the improvement of lives of those in the poorer nations. You have to use the areas you visited during the Education For Life camp (Taman Negara, Tekam Plantation, Cave Complex) to show the importance of the developed countries taking an interest in the less developed countries.

4.3 The Problem crafted for the Normal Technical class

You have to show that the developed countries and the less developed countries rely on each other. Using Tekam Plantation and Taman Negara as examples from a less developed country and Singapore as a model of a developed country, produce a pictorial journey of your experience at EFL and pictures that would show how a developed country is different from a less developed country.

In your pictorial journey, you should also explain the relationship between the two and look at the ways the developed country could help the less developed countries and how this help would be good for the developed countries in the future.

For example, to illustrate the relationship of interdependence between Man and the environment in Taman Negara and in Singapore by comparing and contrasting the two places using pictures and photographs. Your illustration must reflect the realisation of what you have learnt and what you can do to help communities in Taman Negara and the areas visited.

There must be a realisation that there are benefits both ways – in helping and that there will also be (inadvertently) takeaways for the Singaporean student.

5. The Problem-based Learning (PBL) Process

The Education For Life programme focused on the PBL approach where the students can play an active role as "problem solvers confronted with an ill-structured problem that mirrors real-world problems" (Finkle & Torp, 1995). For the teachers, using PBL as an educational philosophy means putting students at centre stage of the learning experience to solve authentic problems of the real world. For the students, understanding the PBL process was necessary as they needed to engage their prior knowledge, explore hypothesis, seek and build new knowledge, apply the knowledge, refine their hypothesis and check out possibilities before they are satisfied with the solutions (Wee & Kek, 2002).

For all the three groups of students, the steps and stages taken for the PBL process is similar. The groups were formed prior to the Education For Life (EFL) programme. With the formation, group contracts were drawn up. The teachers took the students through the PBL process so that they could be engaged in their problem-solving and learning from the real world once they embarked on their journey. The teachers facilitated the students' learning by familiarising them with the processes shown in the table below:

1	Undertaking the Problem	Students establish their learning objectives based on what they would like to learn on this EFL journey.
2	Presenting the Problem	Students generate possible hypotheses, ideas or hunches and surface initial responses to the problem in question or statement form.
3	Clarifying the Problem	Students rephrase the problem into their own problem statement so that they can manage better. At this point tasks are assigned for individual accountability.
4	Self-directed Learning	Students use their action plans to address their knowledge gap. They go on a fact-finding mission of the learning issues raised in Steps 2 and 3. Students have to gather, organize, analyse and interpret information from multiple sources.
5	Diagnostic Discussion	Students describe and critique the resources they used. They apply the new knowledge to the understanding of the problem. At this juncture, students may need to revise their hypotheses, identify new learning issues and revise action plans.
6	Self-directed Learning	Students repeat the process in Step 4
7	Decision	Students summarise the problem and determine the steps to be taken for a final decision or a solution to the problem..
8	Presentation	Students make recommendations, predictions, inferences or other appropriate resolutions of the problem. They advocate or propose solutions and must be prepared to support the positions they take.
9	Assessment	Students are assessed on the product, oral presentation, process and social processes.

Table 1: The Problem-Based Learning Process (adapted from Wee and Kek, 2002)

6. Feedback from students

Students were asked to give feedback on the programme in relation to (A) Objectives, (B) Activities and Interaction and the (C) Education For Life (EFL) programme itself. The table below captures what the students felt about the EFL programme in relation to their learning of content and skills.

The feedback from the students showed that about 95% of them benefited from the programme especially in problem solving skills and its application. Another 94% attributed their enriched learning to their teachers' facilitation and their instructors' guidance. A very high percentage of 97% has gained tremendously from the programme in terms of being able to appreciate Singapore better. The feedback confirmed that the school should continue with the EFL programme for the students.

C	EFL Programme	SA	A	D	SD	Total
1	The activities conducted taught me how to find solutions to the problems faced.	28.81	66.95	4.24	0	236
2	I have learnt useful skills needed to analyse data (collection, interpreting and drawing conclusions from data).	27.8	59.02	12.68	0.49	205
3	I can apply the ideas / skills learnt in my life / school.	28.69	66.67	4.64	0	237
4	I managed to obtain necessary information for my PBL assignments	14.42	57.67	24.19	3.72	215
5	The facilitation provided by my teachers have helped to enrich my learning.	27.23	66.81	5.96	0	237
6	The instructors were well-prepared to guide the students through the activities.	34.91	58.62	5.6	0.86	232
7	I have learnt to appreciate Singapore better.	78.54	18.88	2.15	0.43	232
8	I am able to apply my knowledge learnt in class in the EFL tasks.	25.32	70.04	4.64	0	237
9	EFL should be a key programme of CHIJ St Theresa's Convent.	73.31	23.73	2.54	0.42	236

SA – Strongly Agree A – Agree D – Disagree SD – Strongly Disagree

7. Conclusion

The Education For Life Programme is about learning that can be carried over and sustained through life. Besides acquiring knowledge on site, the students developed skills in observation, collection and recording geographical data and made meaning out of the data for their specific assignments and tasks. Over and above the knowledge and skills are the values developed through this experiential geographical training. They become more aware of the environment and understand better the attitudes, values and beliefs of people in different human environments and are also able to make judgements on values and attitudes in the use and management of the forest resources. These are very important life skills that need to be developed in the students. It is through such school organised and school based activities that students see for themselves the geographies of a fast-changing world exposing many environmental and other global issues (Ooi, Chatterjea, Chang, & Lim, 2007). Geography education, as seen in this school's customised curriculum, has made an impact on the students' thinking, environmental awareness and behaviours. It is an education for sustainable development and for life.

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A Glance On The Current Trends In Education For Sustainable Development In Myanmar

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Abstract

"Sustainable development" is not a new concept for the world educators. It is a broader social objective, which is concerned with the environmental protection, achievement of social values and economic sustainability. For the purpose of achieving sustainable development (SD), we need to deliver a sound Environmental Education (EE). During the last two decades, with the global increase in environmental protection activities, there has been increasing interest in Environmental Education (EE). The guiding principles of EE are the beliefs that:-

(a) if the people are aware of environmental issues and know how to protect the environment, they will act to preserve it,

(b) that schools should assume responsibility for providing education about environmental issues, and

(c) that EE can be effective as a part of the school curriculum.

Likely, the holistic approach of EE should take fully into account the following proportions:-
(a) EE is not a subject in itself but rather a function of education with s content that is drawn from across the whole of the school curriculum.
(b) Investigation of environmental issues should range form local, regional, and national to global scales.
(c) Integration of education about, in and for the environment is required.

EE should encompass the whole development of environmental awareness, knowledge, values, responsibility and action. Socially critical skills should also be cultivated to empower the students. By recognizing the above concepts, the United Nations (UN) general Assembly on December 20,2000 adopted a resolution establishing a United Nations' Decade of Education for Sustainable Development (DESD).
Our rapidly changing world demands us to be environmentally literate people. Owing to the need of sustainability of the earth forces call us to become global- eco- citizens. This motivates us to educate our students have sustainable behaviour. Such behaviour includes environmental awareness and perception. Due to the vitality of SD, UN nominated 2005-2014 as The Decade of Education for Sustainable Development. The Decade aims to promote education as the basis for sustainable human society and to strengthen international cooperation towards the development of innovative policies, programmes and practices of education for sustainable development (ESD).

1. Education for Sustainable Development

1.1 What is ESD?

ESD is a vision of education that seeks to balance human and economic well-being with cultural traditions and respect for the earth's natural resources. ESD applies trans-disciplinary education methods and approaches to develop an ethic for lifelong learning; fosters respect

for human needs that are compatible with sustainable use of natural resources and the needs of the planet; and nurtures a sense of global solidarity.

Education should always lead to life-long learning and sustainable behaviour. SD is not possible without sustainable behaviour. Upbringing our students to have sustainable behaviour will be emergent task for us. As a developing country, Myanmar is trying to build itself as a new-modern developed nation. On the other hand, the education sector tries create a learning society which can face the challenges of the 21st century. In this process, the nation needs to make its people to become environmentally literate citizens. In this paper, the author will describe the current trends in Education for Sustainable Development in Myanmar and clarify to what extent the Environmental Education programs of Myanmar can contribute to sustainable behaviour and sustainable development.

Interest in the movement of EE has also emerged in the Myanmar society since 90s.

Myanmar is currently facing environmental problems in some parts of the country. It is important, therefore, that the Myanmar people, as well as the rest of the world, be made aware of these national environmental problems, and clearly there is an urgent need to develop and introduce ESD programs into schools. As a necessary step in developing such programs, this paper examines EE in basic education levels, to understand of the current trends of ESD in Myanmar.

Given that one of the most important tasks in developing new educational programs is to know "how" and to "what extent" existing educational efforts address the fundamental issues, this researcher will describe the current trends in Education for Sustainable Development in Myanmar. For this purpose, she will briefly outline the environmental issues currently facing Myanmar and focus on the state of ESD in basic education. The main reason for clarifying this phenomena is:- EE is taught as a new portion of the school curriculum and the most active curriculum reforms have taken place at the basic education level (This will be considered in terms of current environmental movements in Myanmar). Finally, she shall consider how successfully ESD in Myanmar are being carried out in terms of the sustainable behavior of the citizens. For this intention, how the curriculum content could encourage the sustainable behavior of the students will be considered as the backdrop.

1.2 Environmental Issues in Myanmar

Like other developing countries, Myanmar's environmental problems are linked to its growing population—currently, about 54 millions (2007) but with annual rate of 1.3% expected to overcome 60 millions in 2010, the need for economic development.

According to the Myanmar Forestry Department (1995), deforestation is the major environmental problem in Myanmar, with the main reasons being excessive cutting for agriculture, usually shifting cultivation, and increased demand for fuel-wood, timber and non-wood forest products. The deforestation is a contributing factor to the dwindling bio-diversity in Myanmar, but illegal poaching of wild elephants for tusks and primitive hunting methods for birds are also have an adverse effect. Due to the relatively low level of industrialisation pollution problems are highly localised at present, but urbanisation problems, relating to environmental health, sanitation and housing, exist in Yangon, Mandalay and other large cities, and these are expected to grow with the rapidly increasing population in the next few years.

1.3 A Glance on the Current Trends in Education for Sustainable Development in Myanmar

An environmentally responsible citizen could be defined as one who has 1) an awareness and sensitivity to the total environment and its allied problems or issues, 2) a basic understanding of the environment and its allied problems or issues, 3) feelings of concern for the environ-

ment and motivation for actively participating in environmental improvement and protection, 4) skills for identifying and solving environmental problems or issues, and 5) active involvement at all levels in working toward resolution of environmental problems or issues.[11] Hence, the researcher shall briefly look at the recent changes in ESD within Myanmar's Basic Education whether it can train environmentally responsible citizens or not. Especially the curriculum content will be analysed to investigate how they can support ESD and sustainable behaviour of the citizens.

The effectiveness of ESD can, therefore, be measured in terms of how successful it is in stimulating to public participation in environmental programs. As we seek to develop effective ESD curriculum targets for particular groups in the future, it is important to identify the extent to which existing EE is meaningful to the groups in questions. In assessing the significance of an existing ESD program, we must consider how it was created, how it promotes public awareness and participation, and how it brings about societal involvement.

2. EE and ESD in the Elementary Education

Due to curriculum review and reform in Myanmar's education through 30 years plan, changes can be found in EE and ESD could be traced by the current curriculum in the field of education. As part of the proposed curriculum, in addition to the core subjects of Myanmar language, English, and mathematics, general studies will be included at the lower primary level, covering morals and civics, life skills and aesthetic education. At the upper primary levels, the general studies will be replaced by life skill and aesthetic education, which will be supplemented with general science and social studies, consisting of geography, history, and moral and civics.

The current curriculum stresses the importance of fostering good citizenship more than the previous curriculum. EE is incorporated within a number of different subject areas. Within basic science, EE themes include personal hygiene and family health, respect for the natural environment, curiosity in the natural environment, and the importance of natural resources for daily life. Although the new social studies curriculum is not greatly changed, EE can be seen in the added emphasis on nurturing an understanding of the relationship of cause and effect relationship and problem solving, and focus on the inter-dependency of people within a country, among countries and in the global society. Within general studies, EE themes include healthy bodies for healthy lives, observation of natural and social phenomena in the environments, understanding of the relationship between human life and natural phenomena, promoting interest and appreciation for traditional festivals and cultural heritage, and the importance of co-operation within a community.

Hence it can be concluded that **Sustainable Behaviour** like safeguarding self-life, body and health, maintaining natural resources, loving and valuing nature, appreciating the blessing of nature etc are offered in the current primary curriculum.

In current elementary schools, life skills, physical education (P.E), moral & civics, music and arts are taught as co-curriculum subjects. Life skills and moral & civics are specially emphasized for such sustainable behaviour as mental health, physical health, environmental sanitation and studying the nearest environment etc. are offered in the course. In the subject of Science, the curriculum aimed to educate the children to understand and apply the importance of natural resources, to love and cherish the natural environment and conserve and utilize in sustainable manner, safeguard self-body and health. Other subjects like life skills and moral and civics also encourage sustainable behaviour of the children especially for their lives.

2.2 EE and ESD in Junior High School Education

In the Junior High School Level, there are altogether five subjects in the curriculum. They are: Myanmar Language, English, Mathematics, Science and Social Studies (Geography and History). The subjects like, Life Skills, Moral & Civics, Arts, Music, and Physical Education are taught as co-curriculum subjects. EE and ESD are specially offered in Geography and Science. In Geography, the environmental related contents are emphasized for ESD. There are altogether five objectives are laid down in teaching of Science. Among these objectives, understanding how living and non-living things of one's environment are important for survival and conserving the environment with great value is one of the most important objectives. For the purpose of fulfilling this objective, is Earth and Space (Environmental Conservation of the Earth) is specially added in every General Science Textbook's content. Chapter 5 of every Grade's Text material is specially informed about Environment.

In the whole curriculum from Grade Six to Grade Nine, history of environmental movements of the United Nations, environmental problems, environmental degradation and environmental conservation activities are introduced systematically. Regarding environmental problems, the causes of those problems, the current states of the environment due to the respective problem, the consequences of the problems etc are described and taught.

In the Science Curriculum of Grade Sixth, the students have to learn about the Environment and Space and Weather /Climate in the section of Environmental Conservation of the Earth. In the component of Environment, they have to study Atmosphere, Hydrosphere (Resources of Fresh Water), Lithosphere (Types of Land, Soil) and Biosphere (Wild Animals, Forest, Sea Animals). And in the section of Space and weather/Climate, Solar System and Space and Usefulness of Space are taught.

Likely, students have to study about EE and ESD in the same chapter of Grade Seven. The title of the chapter is Earth & Space (Environmental Conservation of the Earth). The students must learn about Man & Environment, Human Beings (Part of Ecosystem), Environmental Degradation (Impact of Human Factor), the Reasons of Environmental Damages, Population Explosion, Poverty, Industrialization, Increase of Vehicles, Modern Life Styles, Environmental Conservation for Mankind, Environmental Education, Environmental Movements, Space, Weather & Climate, the influence of Water Vapour, The Importance of Atmosphere, Agriculture and weather.

In Grade Eight, occurrence of Earth Day, World Environmental Day, United Nations' Environment Programme; history of environmental conservation; problems like air pollution, global warming, extinction of rare species, ozone depletion, acid rain, the causes of those problem, theirs consequences presented and instructed comprehensively.

In Grade Nine, deforestation, the reasons to cause of deforestation, the related environmental degradations are taught logically. Moreover, afforestation and forest conservation, eco-tourism etc are also described in detailed. Soil erosion, the related environmental problems and methods of are also presented in the environmental conservation of the Earth and Space. Hence, it can be said that the sustainable behaviours like afforestation, systematic forest production, substitute energy producing, recycling of used paper, preventing illegal firing forests, establishing natural sanctuaries & natural parks, promoting eco-tourism, controlling shifting farms, controlling chemical fertilizer & pesticide, using bio-fertilizer, systematic ways throwing away of industrial- wastage etc are informed logically. Also, preventing illegal trade of rare species of flora & fauna, preserving flooding areas etc are efficiently educated. Thus, it can be concluded that the matter of ESD for the Junior High School students becomes up-to-date and valuable.

Hence, it can be interpreted that science and geography are the major subjects that could educate both EE and ESD for the students. Science could specially provide EE and sustainable behaviour for the learners. Curriculum revision could diagnose the weakness of the previous curriculum. It could provide the environmental awareness, environmental knowledge and environmental manners of the learners. Science curriculum is quite valuable for

culturing environmental values, ethics and sustainable behaviours of the learners quite satisfactorily.

In the Junior High School Level, co-curriculum subjects like, life skills, moral & civics, P.E, music, arts are also specified like other levels. In this level, EE and ESD are offered not only in academic curriculum but also in co-curriculum. In the six grade's life skills syllabus, environmental health and safeguarding of self-body, balancing nutrition, using clean water, using and maintaining healthy toilet, psychological development, accidents, prevention of epidemic diseases (Tuberculosis, HIV/AIDS), drugs abuses are emphasized. Social skills like right decision, counselling and guidance, school-environment sanitation, self-controlling, safeguarding mental health, self- knowing etc are specially nurtured. In the EE, throwing garbage and its consequences and good practice for environmental protection by garbage is particularly emphasized.

In the seventh grade, the following sustainable behaviours are specially trained. Establishing basic classroom disciplines, safeguarding self-body and health, psychological development, prevention of epidemic diseases (Hepatitis B, HIV/AIDS), drug abuses are especially emphasized. Regarding social skills, such sustainable behaviour, thinking before doing, communicating effectively, controlling psychological problems of adolescent age, counselling & guidance, mental health are educated. Concerning EE, air pollution problem and related issues and ways of controlling air pollution problem are educated. Ways of self-introspection also practiced in this grade.

In the eighth grade, psychological development of the youth, using and maintaining clean water and toilet, prevention of accidents, prevention form epidemic diseases (malaria, HIV/AIDS) drugs abuse, leprosy, avoiding tobacco, mental illness and self knowing, etc are skilled. Water pollution and maintaining environmental greening are specially emphasized in EE.

In the ninth grade, sex education is introduced in the section of safeguarding body. Parents' love, avoiding sexual intercourse before marriage is educated. Regarding diseases, venereal diseases, drugs, HIV/AIDS, participating in avoiding alcohol and drugs, maintaining mental health, self-actualisation, etc are taught. In the EE section, preservation of animals and forest conservation are educated.

In summary, it can be interpreted that the life skills curriculum is one of the most important area for nurturing sustainable behaviour for one's life long process. It could provide both EE and ESD not only from social aspect but also from environmental aspect. Most of the content for ESD is strongly related with Health Education. Although moral civics could inculcate the important social and moral ethics and values, it could not encourage EE and ESD.

2.3 EE and ESD in High School Education

In basic Education High School level, different combination of subjects, like science, arts, art-science streams are divided and the students have to select self-interested combination. EE and ESD are specially offered in geography, biology, chemistry and life skills. Most the content are similar with Junior High School level.

Geography curriculum of the High School Level is strongly related with the Junior High School Level. There are much environmental related content in the text materials. The teacher could be able to relate the geographical phenomena and EE and sustainable behaviours of the learners. For example, Different Types of Forests, Forest Industry and Products could be linked with deforestation problems and environmental conservation done by forest sector, prevention of flora and fauna, preservation rare species, soil rehabilitation, etc. Another example will be simplified by physical geography. In studying hydrosphere, it can be linked preservation of fresh water, the importance of clean water, water pollution, extinct species of sea-animals, flooding problems, global warming, natural hazards etc could be educated.

In Biology, Environmental Biology is introduced. The contents are: A biotic or Physical Factors of an Eco-system, the Biologic Environment & Interrelations of Organisms, Symbiosis, Parasitism, Commensalisms, Mutualism, Cycles in an Eco-system, The Water Cycle, Nitrogen-Cycle, Other Factors, Pollutions, Air Pollution, Land & Water Pollution, The Use and Abuse of Drugs (Drugs, Use of Drugs, Heroin), Alcohol, Smoking and Health. So, it could be concluded that Biology is one of the most effective subject for informing EE and ESD in High School Level.

Another subject that can train EE and ESD in the High School Level is Chemistry. In the present curriculum is Chemistry. In the curriculum, Chemistry in Society is the only one section, which inform EE and ESD for the learners. The content of this section are: Chemistry in Modern Agriculture, Elements required by plants, Soil, Fertilizers, Natural Fertilizers, Chemical Fertilizers, Nitrogen, Phosphorous and Potassium, Effects of Nitrogen, Phosphorous and Potassium, Classification of Chemical Fertilizers, Nitrogen Fertilizers, Urea, Production of Urea, Reaction of the Soil, Ammonium Sulphate, Ammonium Nitrate, Calcium Nitrate, Super phosphate, Bone meal, Potassium fertilizers, Soil Reaction, Test for Soil Reaction, Neutralization of soil acid, Neutralization of soil alkali, Insecticides, Growth Substances, Cement Production, Cement, Raw Materials for Cement Production, Manufacturing Process, Plaster Paris POP, Salt Production, Traditional Methods of Production, Disadvantages of Traditional Methods of Sault Production, Sault Production by Solar Evaporation and Bittern. Therefore, High School Chemistry Curriculum also encourage the EE and sustainable behaviours of the learners to some extent.

3. Conclusion

Previous research has stressed that the effectiveness of ESD programs is related to the level of public sustainable behaviour, for no environmental programs can succeed if the public are unaware of the importance of environmental conservation and do not actively participation. Public awareness, public participation and ESD all play crucial roles in protecting the environment and promoting sustainable development.

The effective implementation of environmental programs and activities depends to a large degree on the level of commitment and involvement of the public, from individuals to groups, organisations and local communities comprising youth, women and indigenous people. This statement points out the requirement of sustainable behaviour.

EE to raise environmental awareness and sustainable behaviour is therefore essential to increase public participation in environmental protection. Through the curriculum content of EE in basic education and teacher education, the standard of ESD in Myanmar is quite reliable for educating environmental concepts and environmental problems of the nation and the world. On the other hand, it can be interpreted the EE of Myanmar schools could encourage sustainable behaviour of the students to some extent. To make a sound ESD programme we need to make much research in the field of environment and public education.

The government action to form controlling national environmental matters, developing the national environmental policy, improving Myanmar Agenda 21, enacting new environmental laws and legations including forest laws, trying to increase the environmental awareness, etc are the urgent actions to of the regional and international environmental movements. The active responses to regional and international environmental programs are greatly connected with the current changes in economic and development policies.

The introduction of EE in under graduate and postgraduate levels is the significant action to the environmental movements of the nation. Environmental issues and movements at the national level are currently shaping EE at the primary level. EE is becoming more wide spread and is being actively carried out as a form of societal education rather than as part of school education. In informal settings, EE is being linked to literacy and community development education, consumer and vocational education are being stressed. Within formal

education, EE is currently being offered as either a co-curriculum activity or as an academic subject. It is a part of the science, social studies, moral, civics, life skills and aesthetic education. The aim of these EE programs is foster dutiful citizens capable of working for sustainable development. In the 1998 academic year, the course was re-introduced in the curriculum, but this time, the main aim of the course was to educational goal of fostering well-developed citizens. The point that is clear from this paper is that the re-introduction of EE at the primary education level is a response to the demands for national and global sustainable development. Such trends and movements reflect the actual state of ESD and sustainable behaviour of the citizens.

The recent changes of EE in basic education might support the process of increasing environmental awareness of the national prospect of environmental programs to some extent. But, the public environmental awareness of the nation cannot cover only such activities within the basic education. Especially, sustainable behaviour of the people could not be promoted in national level. The range of ESD should be enlarged every aspect of education. Public education should be carried out by various channels of media.

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Lucerne Declaration on Geographical Education for Sustainable Development[i]

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The International Geographical Union Commission on Geographical Education sees the UN Decade of Education for Sustainable Development 2005-2014 as an opportunity to confirm its commitment to education for sustainable development. Contemporary global changes challenge humankind in the 21st century. We respond with the proclamation of a "Declaration on Geographical Education for Sustainable Development". The declaration extends the foundational International Charter on Geographical Education (1992) with a focus on:

A. **The Contribution of Geography to Education for Sustainable Development**

B. **The Criteria for Developing Geographical Curricula for Education for Sustainable Development**

C. **The Importance of Information and Communication Technologies (ICT) in Education for Sustainable Development in Geography**

A. The Contribution of Geography to Education for Sustainable Development

The International Geographical Union Commission on Geographical Education shares the vision of the UN Decade of Education for Sustainable Development (UNDESD) 2005-2014, which sees education for sustainable development (ESD) contributing to "a world where everyone has the opportunity to benefit from quality education and to learn the values, behavior and lifestyles required for a sustainable future and for positive societal transformation" (http://portal.unesco.org/education/). Nearly all of the "action themes" highlighted in the UNDESD, including environment, water, rural development, sustainable consumption, sustainable tourism, intercultural understanding, cultural diversity, climate change, disaster reduction, biodiversity, and the market economy, have a geographical dimension. This Declaration proposes that the paradigm of sustainable development should be integrated into the teaching of Geography at all levels and in all regions of the world.

Sustainable development of the "Human-Earth" ecosystem as a paradigm for the 21st century
At the Rio Earth Summit 1992 nearly all countries of the world agreed to accept sustainable development as a goal. Article 36 of Agenda 21 describes the importance of education for sustainable development. The Johannesburg Summit 2002 broadened and reconfirmed this paradigm.

The Commission's vision of education for sustainable development is based on the concept of the **"Human-Earth" ecosystem**. "Eco" comes from the Greek word "oikos", meaning household. In terms of human survival a household should not spend more than it earns. Ecology can be seen as the science of housekeeping; we need to sustain the household of the "Human-Earth" ecosystem that includes nature, culture and society and the economy.

The **"Human-Earth" ecosystem** can be differentiated into the Earth and Human systems.
- The **Earth system** or geosphere, consists of such sub-systems as lithosphere, pedosphere, atmosphere, hydrosphere, biosphere and anthroposphere. The outer world of the Earth system is the cosmos, extra-terrestrial space. There is an exchange of matter and energy between the Sun, space and the Earth. The Earth offers society the necessary resources and natural sinks.
- The **Human system** or anthroposphere, consists of such sub-systems as settlements, agriculture, industry and transportation. Geographers analyze how the geosphere provides resources and living space to the Human system and how society has an impact on the Earth system. That way, geographers build a bridge between the natural and social sciences and study the whole "Human-Earth" ecosystem.

The **individual** is of special interest for educators because education of individuals is one of the most important ways of contributing to an understanding of sustainable development. The exchange between the individual and society aims at the socialization of the individual as well as at the development of society. The freedom of action of the individual within a particular frame of natural and social conditions is the precondition that education can have an impact on students' sustainable behavior. The knowledge, perceptions and values of people are crucial for implementing sustainable development. The consequence of this thinking in systems is the necessity to think ecologically or holistically, i.e. how nature, society and individuals are interconnected. Ecological housekeeping means not consuming more than can be regenerated.

Sustainable development refers to the sustainability of **nature**, **economy** and **society**. It is a contentious issue since nations, cultures, groups, and individuals interpret the definition to suit their own needs. Thus, some emphasise economic sustainable development as they seek to enhance their consumption levels while others emphasise environmental sustainable development as they seek to conserve threatened species. Sustainable development and consequently education for sustainable development are culturally defined.

Sustainable development of nature means the consumption of resources not faster than they can be renewed. We have a duty to preserve natural resources for future generations. The consumption rate should not exceed the regeneration rate. Environmentally damaging activities must be brought under control to restore and protect the integrity of the Earth's system.

Sustainable development of the economy includes sustainable development of nature. Jobs for all and growing living standards remain important targets. For some countries this means more consumption of natural resources; for others it means new resources-saving technologies and new lifestyles and solidarity. To reach these objectives is one of the biggest challenges in the future.

Sustainable development of society means equal life chances for all. To reach this goal, it is imperative that people in developing countries can satisfy at least their basic needs and that people in industrialized countries agree to strong directives from the international community to limit their consumption of natural resources. However, more important than such action would be the development of new values, philosophies and ecological behavior that are seen as promoting new and better ways of living than the old ones, replacing production and con-

sumption structures based on quantity by an economy, a society and individuals focused on qualitative improvements.

Strategies for implementing sustainable development
The main strategies to implement sustainable development are:

- **Efficiency-strategy:** through new technical and organizational innovations resources can be used more efficiently.
- **Consistency-strategy:** through renewable resources and closed economic circuits the ecology of flows of material and energy can be improved.
- **Permanency-strategy:** through technical innovations the lifespan of products can be extended.
- **Sufficiency-strategy:** through new life styles based on insight the consumption of resources can be minimized.
- **Education and social commitment:** through education and social commitment justice, satisfaction and sustainable development can be discussed and lived.

Sustainable development implies, therefore, the combination of ecological, economic and societal sustainability by the development of new production and consumption patterns, as well as new life styles, and last but not least by the creation of a new ethic for the individual through lifelong education, including Geographical Education.

Geographical competencies to enhance sustainable development
The most important geographical competencies implementing sustainable development are:

- **Geographical knowledge and understanding**
  of:
  - major natural systems of the Earth in order to understand the interaction within and between ecosystems.
  - socio-economic systems of the Earth in order to achieve a sense of place.
  - spatial concepts – key ideas unique to Geography that help students to make sense of the world: location, distribution, distance, movement, region, scale, spatial association, spatial interaction and change over time.

- **Geographical skills**
  in:
  - using communication, thinking, practical and social skills to explore geographical topics at a range of levels from local to international.

- **Attitudes and values**
  - dedication to seeking solutions to local, regional, national and international questions and problems on the basis of the "Universal Declaration on Human Rights".

Interdisciplinary competencies to enhance sustainable development
Besides specific geographical competencies, interdisciplinary skills crucial for sustainable development to be developed in collaboration with other subjects are:
  - to focus on problems, to evaluate alternatives, to calculate risks;
  - to perceive complex cause-effect relations and dynamics;
  - to reflect about side effects and consequences that are to be expected from an action;
  - to think in systems and complex networks;
  - to find, evaluate, process and use information with appropriate methods;
  - to respect other views and opinions;
  - to think about and evaluate one's own personal motives;

- to give one's own life sense and an ethical basis;
- to contribute to common tasks with one's own competencies;
- to commit to environmental planning and projects;
- to evaluate one's own actions and their results;
- to perceive life-long learning as an enrichment of one's quality of life;
- to perceive problems and phenomena from different perspectives;
- to flexibly apply different methods to solve problems;
- to relate local and regional experiences to global phenomena.

As described above Geography Education can greatly contribute to achieving the goals of the United Nations Decade of Education for Sustainable Development by providing relevant knowledge, skills, values and attitudes crucial for a peaceful coexistence of individuals with nature on this planet. Sustainable development is future-oriented and is a concept of peace between humans and nature and a concept of justice between generations, different nations, cultures and regions of the world. In addition to social, environmental and economic concerns, the concept of sustainable development also extends to global responsibility and political participation. The action competence that is needed for such challenges can be learned - in cooperation with other subjects – through Geographical Education.

B. The Criteria for Developing Geographical Curricula for Education for Sustainable Development

The Commission on Geographical Education maintains that it is unwise to seek consensus on a global curriculum. Curricula contain objectives and content that relate to regional and national needs differing from region to region and from country to country. A global curriculum would ignore or deny regional and national needs and differences. Because a global curriculum is not practical, the Lucerne Declaration establishes basic criteria that should be followed when national geography curricula are developed, renewed or evaluated. The following criteria are considered to be essential for education in sustainable development in Geography:

Criteria for finding geographical objectives

Educational objectives of national curricula should contain a balanced range of knowledge dimensions, process dimensions and applied dimensions as well as the dimension of values and attitudes.

Criteria for selecting geographical themes

• **Major issues in the contemporary world**
  These include a selection of issues concerning humankind and nature that are important for life, for appropriate spatial behavior and sustainable behavior. Themes such as global warming, energy depletion, overuse of non-renewable resources, population change, and global disparities can be used. Consideration of conflicts resulting from contradictory targets concerning environmental, economical and social sustainability is appropriate.

• **Geographical perception of space, place and environment**
  Themes include the provision, use, evaluation, formation and meaning of space, place and environments.

- **Geographical ways of looking at spatial organization**
  This criterion involves functional**,** systemic, prognostic, action-related, structure- or process-related approaches.

- **Illustrative examples**
  involve the selection of contents that serves as a model concerning structure/processes related to a topic, concerning important and transferable insights into a problem; contents are suitable for the transfer of ideas.

- **Students' experiences, interests and preconceptions**
  involve the consideration of the experiences, interests and preconceptions of students at different age levels.

- **Significance for the individual, people, culture and the environment**
  This criterion includes the importance of issues in private, public, political, professional or economic contexts.

- **Balance**
  involves the selection of diverse, contrasting and multidimensional topics and the consideration of different perspectives of different actors with differing interests.

Criteria for selecting geographical areas

- **Illustrative Examples**
  involves the selection of significant areas that are useful to learn about structures/processes as models or that are useful to gain transferable insights.

- **Students' experiences and interests**
  This criterion includes the consideration of students' knowledge, interests and experiences at different age levels.

- **Significance**
  involves the consideration of the political, economic or dimensional position of an area and the consideration of its ecological/environmental importance.

- **Variety in special extent**
  involves consideration of the local, regional, national, international and global scale.

- **Balance**
  Themes include the selection of areas that are diverse and contrasting in terms of their position, type and size.

- **Topographical coverage**
  This criterion aims at themes that help to grasp the idea that space can be seen generally or thematically – as a comprehensive orientation grid or a network of single topographical objects.

Criteria for selecting learning approaches

- **Reference to the interests of the different age groups**
  I.e. the preferences and interests of different age groups should be kept in mind.

- **Degree of learning demands**
  That means, the demands on the learners should increase in volume and difficulty. The learner should accomplish tasks with an ever growing degree of independence.

- **Learning series of connected facts**
  That is to say that connected facts should be arranged in a way that they build on each other.

- **Complexity**
  That is contents and methods starting from simple case studies and become more and more complex.

- **Abstraction**
  That is starting from concrete space-related phenomena and developing towards more abstract models.

- **Ways of looking at things**
  That criterion involves that at the beginning of the learning process priority should be given to the physiognomic, then to the process-related and finally to the functional and prognostic way of looking at things; constructivist approaches should be used to understand concepts, processes, theories and space as changeable societal constructs.

- **Inclusion of case studies in interrelated contexts and overviews**
  i.e. illustrative examples should be connected to regional contexts.

- **Regional sequence**
  That is to say that regional topics should not strictly be arranged from near to far but in a sense of a view into the world.

- **Spatial extent**
  That is taking all levels of scale into account, which is the small-scale, medium-scale as well as the international and global dimension.

C. The Importance of Information and Communication Technologies (ICT) in Education for Sustainable Development in Geography

The ability to act as a responsible and democratic citizen is a precondition for the implementation of sustainable development. This ability can be developed through access to up-to date information and through lifelong learning. Geographical methods, such as mapping, map reading, fieldwork, statistical analysis, interviewing, calculating, the interpretation and production of images, texts, graphs and diagrams are widespread nowadays and practiced daily in many schools. Information and Communication Technology, in contrast, although it has greatly influenced the science of geography in the last fifteen years, is not as often been used, as it should be, mainly due to the lack of hardware/software in classrooms and the limitations of in-service teacher training.

ICT literacy is becoming a major learning objective because the reach of print media is gradually diminishing while digital media are on the rise. It is therefore highly probable that ICT will gain considerably in importance in the years and decades to come. This holds true

for developed as well as developing countries. Additionally, young people are highly motivated and interested to work with digital tools and interactive media, which are important premises to meaningful learning. Therefore, digital media education with a focus on the principles of teaching and learning with digital media, media literacy, and digital literacy are of additional value for education in Geography.

ICT can contribute meaningfully to the aims of education for sustainable development in Geography teaching and learning described in this Declaration by helping students to acquire knowledge and develop competencies necessary for lifelong learning and active citizenship.

The specific value and potential of ICT for ESD in Geography

In Geographical Education, media add general value to teaching in terms of serving as a resource for information from various, often contradictory sources, but also in terms of organizing, processing, interpreting and presenting information. The Internet, software in general and specific geographical software (such as computer simulations or the Geographical Information Systems GIS) and hardware (for example mobile tools such as Global Positioning Navigators GPS) add specific value to Geographical Education by providing easily accessible, up-to date information, new and innovative means for teaching and learning with web-based information, and enhance communication and cooperation, for example in the settings of E-learning and blended learning. The benefits of the use of ICT contribute to the aims and objectives of Geographical Education for sustainable development in a sense that ICT helps

- to acquire up-to date knowledge easily
- to compare contradicting information
- to look at things from different, multi-perspective points of views
- to gain direct insight into the attitudes and perspectives of people who are personally affected by issues of sustainability (i.e. impacts of natural disasters, environmental pollution, economic crises)
- to analyze the world and its mental representations
- to better understand the conceptualizations and attitudes concerning issues of sustainability of people from different cultures
- to visualize multi-dimensional environmental issues related to sustainable development
- to promote higher thinking skills like synthesis and evaluation
- to develop understanding, skills, attitudes and values, necessary for sustainable behavior.

ICT will dramatically change teaching and learning in the future. Its specific potential for ESD in Geography lies in the interactivity of the tool, in it's suitability for self-directed and cooperative learning arrangements and in its enormous richness in terms of attractive up-to-date contents and learning opportunities for topics concerning ESD.

ICT and research in Geographical Education for sustainable development

The use of ICT in geographical teaching and learning for sustainable development extends the focus of research on new areas. An important field for research concerns the influence of ICT on narrowing the gap between environmental knowledge and sustainable behavior. As a result of such research we would better understand of how to improve teaching and learning in Geography to meet the competencies listed in this Declaration. The Geographical Union Commission on Geographical Education promotes academic discussions and exchange for research concerning ICT and Geography Education.

ICT and international co-operation

The possibility of online collaboration to enable virtual meetings between people all over the world adds an additional value to digital media especially in the context of intercultural learn-

ing and global learning. This is of particular advantage for developing countries, which can benefit from international co-operation and collaboration. Enabling cooperation between schools around the world to support teaching and learning with digital media / online co-operation is a priority and an objective for the Geographical Union Commission on Geographical Education.

Proclamation

The International Geographical Union Commission on Geographical Education proclaims this Declaration and recommends the principles presented in this document as a basis for a sound Geographical Education for sustainable development to all geographers and governments in the world.

Signed by the chair of the International Geographical Union Commission on Geographical Education (IGU CGE)

Lucerne, 2007-07-31   Prof. Lex Chalmers

                                                                      Chair, 2004-2008 Commission

This Declaration has been drafted by Hartwig Haubrich, Sibylle Reinfried and Yvonne Schleicher, published through the commission's home page, commented by the commission's members and delegates from many countries around the world, revised several times and finally discussed, accepted and proclaimed at a IGU CGE Regional Symposium in Lucerne Switzerland on July 31, 2007.