THE ENVIRONMENTAL CONCERN OF NINE-GRADE STUDENTS FROM A SECONDARY PROFESSIONAL SCHOOL

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Abstract. The study analyzed the historical development of worldviews on human-environment interrelationships, different environmental attitude measuring instruments and the properties of the New Ecological Paradigm scale (NEPs). Based on the analysis, the NEP scale was considered a good and reliable attitude-measuring instrument and was employed for assessing environmental concern of students in a vocational school. A self-administered survey questionnaire was used to collect the necessary data. On the whole, students demonstrated positive attitude to the environment. They showed strong attitudes on the possibility of ecocrisis and weak attitudes on limits to population growth, better outlined tendency to ecocentrism than to anthropocentrism, and a good understanding of the delicate nature of the ecological balance. Their trust in technological advancement and in human intellectual abilities to solve ecological problems was well expressed. A

significant part of them (about one fifth) demonstrated uncertainty acting on the save side. The mean scores (4.18 for the test and 4.15 for the re-test) for NEP significantly predominated over the mean scores (3.23 for the test and 3.20 for the retest) for DSP. Results will be employed in curricula and teaching strategies improvement.

Keywords: environmental worldviews, environmental attitude instruments, new ecological paradigm, environmental attitude assessment

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Introduction

Environmental concern is a complex concept, which has many facets because of the complex structure of the human environment and even the more complex composition of human-environment interactions. It is also a concept of culture based on many branches of science (ecology, biology, geography, physics, chemistry and geology), history, sociology, ethnology, politics, technology, etc. In a concise sense it means "advocacy for or work toward protecting the natural environment from destruction and pollution" and it is theoretically backed by the research findings "that environment rather than heredity is the primary influence on intellectual growth and cultural development."[1)] Hutchins (1968) defines an ideal society as one that "develops intellectual mind". All cognitive and constructivist theories of learning value the social influence upon personality development of individuals. It is through culture that human beings understand their interaction with the environment, but culture co-evolves with evolution of concepts. Environmental concern implies "worldwide efforts to bring environmental education (EE) to the forefront of students' lives,"[2)] "a belief in and active concern for the state of Earth's natural resources and for the importance and influence of environment within a society."[3,4)] In ethical terms, it is "a necessity for sharing and

conservation, having a responsibility for our environment."[5] Environmental problems become known via scientific knowledge, activists' efforts and media attention, i.e. via social processes.[6] Therefore, to understand, apply and interpret the concept of environmental concern, it is important to view the successive stages of the understanding of the concept "environment" and human attitudes to it.

Conceptual framework

The understanding of the complexities of the interrelationships between the natural environment and human activity is a necessary condition for the maintenance and improvement of environmental quality. Human-environment relation started as *biological determinism*, based on Charles Darwin′s theory of natural selection (1859) and Ernst Haeckel′s[7,8] definition of ecology (1866). In his book "*Morphology of organisms*" Haeckel defined ecology as follows: "By ecology we mean the body of knowledge concerning the economy of nature – the total relations of the animal to both to its inorganic and organic environment." He established the link between physical and biological sciences and the interaction of abiotic and biotic factors of the environment (Llobera, 1998).

As research enlarged and deepened the understanding of humans, new aspects of human-environment interaction and new scientific disciplines emerged – psychological ecology, ecological economics, ecological architecture, environmental sociology, ecological geology (eco-geology), ecological geography, ecological chemistry, human ecology, etc. (Little, 1991). Biological determinism was unable to give a fully satisfying explanation of human-environment interactions as it assumed the priority of genetic constitution in shaping human behavior. Evolutionary psychology like Social Darwinism before it, served to legitimate current social formations by giving them a genetic basis. Neither was adequate the *environmental*

determinism, which sought the causes for personal, social and cultural development in the climate and the geographical conditions of a given country.

In 1970s environmental sociologists sought the reorientation of sociology toward a more holistic perspective that would conceptualize social processes within the context of the biosphere (Huber, 2002; Buttel, 2003; Wilson, 1975) and developed the concept of *social determinism*. Areas of research within environmental sociology emerging nowadays are environmental justice, global environmental change and urban environment. The Standard Social Science Model (SSSM) assumes that no part of human nature is inherited and cultural forces fix all human attributes. Social determinism cannot account for all factors of the human-environment interaction, as many phenomena within this interaction have not been enlightened yet. It cannot fully explain and take into account the unique position of humans in the ecosystem as both a part of it and a social, moral and reflective being. It cannot overcome the biological determinism and reductionism regarding nature only outside human beings, not inside them, failing to understand the interaction of biological and social evolution and underestimating the meaning and usefulness of ecological concepts **(**Zavestoski, 1997). Social determinism neglects the psychological and cultural aspects of human-environment interaction, the role of ecological consciousness and behavior and the differences in the consumer culture of societies. The contribution of environmental sociology is prominently visible in the study of societal-environmental interactions, placing special emphasis on studying the social factors that cause environmental problems and on efforts to solve them. It views environmental problems via social processes despite the material bases they have external to humans.

Taking into account the words of Mills (1959) that "All sociology worthy of the name is historical sociology … the historical view point leads to the comparative study of societies", it is useful to construct an evolutionary

picture of the concepts′ development within societal-environmental interrelations (Appendix).

Biology, sociology, phylosophy[9] and political sciences[10] exercise their influence on the different trends of understanding human-environment relationships and the emphasis gradually changes from biocentrism to ecocentrism (a nature centered system of values) and reflective modernization (Vernadsky, 1998, originally published 1926). The global crisis is anthropo-ecological as it involves interaction between abiotic, biotic and anthropogenic factors and the decisive factors are the anthropogenic, as T. Beckman states: "We cannot discuss and understand ourselves until we acknowledge and understand the environment to which we are related. Most of environmental abuse, today, starts within and is caused by the contemporary fact that we are short-sighted and ignorant about the specific environs that nurture us."[9] *Human exemptionalism* (Adler, 1993), regarding humans above nature, independent of it, cannot give rational explanation of environmental problems.[11] *Anthropocentrism*, interpreting environment exclusively in terms of human values and experience as if humans are the central element of the universe, also does not give adequate viewpoint for responsible human behavior to prevent and solve environmental problems (Grey, 1993).

Environmental policy motives behind environmental policy-making are predominantly economic. Economic criteria constitute the foundation of decisions making about the design, performance and evaluation of production and consumption. Malthus (1896) presented his theory on population dynamics and its relationship with the availability of resources. He stated that the development of mankind was severely limited by the pressure that population growth exerted on the availability of food. Population growth is geometrical, but food production – arithmetical. The theory evoked lots of discussion and controversy that has not ended yet. Many authors try to refute his claims, showing how common property could be successfully managed by

group using it, (Ostrom, 2007), and how the causes of famine can be overcome (Sen, 1995, 1999). In the industrialized countries living standards improve permanently without a subsequent increase in population growth rate. Technological improvement and capital accumulation are strong forces that relax the population pressure, improve the living conditions in the presence of growing population (*technological determinism*) (Latour, 1996). *Neo-Malthusians* propose a doctrine advocating control of population growth. Taking into account the carrying capacity of ecosystems and the biosphere as a whole their doctrine needs consideration (Abramitzky & Braggion, 2004; Galor & Weil, 2000; Galor & Moav, 2001, Deval, 2007). Many authors, sociologists, economists and political scientists criticize capitalist political economies for causing degradation of the environment independent of abstract population[12)] (Foster, 1999; Elwell, 2009). Organized degradation of rain forests is caused by states and capitalists who push people off the land before it is degraded, by organizational means (Schnaiberg, 1980). The economic synthesis of Schnaiberg states that the desire for economic expansion will prevail over ecological concerns and that is the case in eastern countries after the collapse of socialism. Policy has decided to maximize economic growth at the expense of environmental disruption. His second statement concludes that governments will attempt to control only direst of environmental problems to prevent health and economic disasters, giving the impression that they act more environmentally than actually do. His third statement refers to a hypothetical case when environmental situation is so severe that governments respond with sustainable policies. Economic damage caused by environmental degradation serves as a driving force to sustainability accompanied by rational use of renewable resources.

Schnaiberg′s metaphoric expression, *the treadmill of production*, is a model of conflict and cooperation between the state, monopoly capital and organized labor. All the three groups have one desire in common – economic

expansion, which ends up in more goods and greater income. Political capitalism works against smaller scale capitalism and against other alliances of labor, as it is based on the propaganda that worker consumption can only be achieved through further capitalist consolidation. That acceleration of the treadmill establishes the consumer society, which increases the tension in state environmental-policy making as economic policies are subject to less and less environmental assessment (*eco-marxism*) (Foster, 2002, 2006; Elwell, 2009). The ecological illiteracy of the state and worker leaders is the reason for the support that both of them give to the monopoly capital and at the same time to deterioration of the environmental quality. Armed with ecological culture and consciousness, state and working labor movements may design policies to shrink the scale of the economy and the consumptive requirements and solve environmental problems.

The treadmill model demonstrates that the choice between barbarism and civilization is not simply a question of the organization of the human relations within society but also a question of the organization of the human relation to the environment. Buttel (2004) supported this model as it helps to explain the expansion of environmental problems in the modern era. Owners of the means of production, who seek to increase profit, induce advances in technology. These advances drive the expansion of production and consumption synergistically (economic expansion and increased consumption). A path of production starts that needs more production because all sectors of society depend on continued economic growth to solve the problems of unemployment, generated by mechanization, which are created by growth itself. The solution of social and environmental problems is sought in speeding up the treadmill. Economic expansion favors the large firms and is accompanied with alliances among capital, labor and governments[13]. Environmental problems cannot be solved because growth increases the demands on environmental resources and generates pollution (Commoner, 1971). Thus achieving environmental sustainability, characterized by

maintaining both social equity and environmental protection requires radical restructuring of the political economy and overcoming the growth dependence.

Ecological modernization, starting through both state and capital restructuring, attempts to integrate economic growth with environmental protection (Mol & Sonnenfeld, 2000; Fisher & Freudenberg, 2001; Spaargaren et al, 2006). The theory of ecological modernization is practically expressed by the following examples: cradle to cradle (regenerative) production cycles, industrial ecology (rational use of resources and waste disposal), organic agriculture (crop rotation, green manure, compost, biological pest control), biomimicry (biomimetics, imitation of nature), permaculture (sustainable land use design on ecological and biological principles), agroecology (application of ecological principles to the production of food, fuel, fiber and pharmaceuticals). It is a holistic economic, industrial and social framework that seeks to create efficient and waste free systems, insuring sustainable development.

Ecological crises in modern society need a system analysis leading to theoretically, methodologically and normatively opened up political theory, which has to account for fundamental fragility and mutability of social dynamics, shaped by globalization of capital and risks at the beginning of 21st century (Beck, 1992, 2008; Eckersley, 1992; Gould, 1996; Gould et al., 1998; Little, 1991; Mosquin & Rowe, 2004; Tolan, 2009). *Reflexive modernization*, constructed as a theory of *cosmopolitan modernity,* requires reflecting the benefits of modernization and industrialization and transforming the whole political and economic system′s institutions, making them more rational with ecology in mind (Beck & Grande, 2010; Mehta & Ouellet, 1995).

The diversity of views, reflecting the complexity of nature-society interdependence, makes it difficult to construct a general paradigm, encompassing the many aspects of ecological concerns, as there are rational elements in each theory. Nevertheless a modern integrated socio-eco-political

theory is being in the process of development but no theory can solve anthropo-ecological crises without ecological culture, consciousness and behavior of the whole of humanity.

Theoretical framework

The studies and explanations of human-environment relationships on different levels – individual, group, societal, political, economic, organizational, etc., is of great value for the development of a scale to measure environmental concern of people. Different types of social paradigms, such as the Order paradigm, the Pluralist paradigm and the Conflict paradigm (Purdue, 1986) had been experienced by human societies in their historical development.

The term "paradigm" means a pattern or an example, serving as a model or standard, a shorthand description of the worlds view. It implies a set of assumptions, concepts, beliefs, values, and practices that constitutes a way of viewing reality for the community that shares them. An environmental social paradigm can be used to describe a new way of thinking about how people approach their activity after they have seriously considered the impact on production efficiency, economic validity, social responsibility and environmental compatibility. These four factors can be represented like four sides of a pyramid and come together to form a strong structure, which can become a personal philosophy for every day behavior.[14)]

The Human Exemptionalist Paradigm (HEP) was dominant within the social sciences till the 1960s. According to it humans are exempt from laws of nature, because they have special attributes that make them different from other species and human technology can overcome limits. The HEP claims that human-environment relationships are unimportant sociologically because humans are independent from environmental forces through cultural change. Human dominance is justified by the uniqueness of culture, which is more

adaptable than biological traits. The natural world cannot pose limitations because people control their own destiny (Fig. 1, Economic model).

The Dominant Social Paradigm now (DSP) represents a shift from democracy to corporate rule, which favors economic growth, scientific development, competition, free market economy, care for the present population without thinking about the future, exploiting the grow-or-die principle, combining financial and political resources and enduring risks.[15,16)] It expresses only the values and beliefs of the ruling elite, interested in the reproduction of the existing institutions that secure also the reproduction of their own political, economic and social power (Schnaiberg, 1980; Buttel, 2004; Beck, 2008; Purdue, 1986; Dunlap et al., 2000; Kilbourne, 2004). DSP comprises three basic beliefs.[16)] (1) Technology will spare the planet and all detrimental things can be resolved with continued pursuit of industrial advancement; (2) Economic growth, measured by the Gross National Product (GNP), and prosperity will resolve societal problems. The primary goal of any Government is to increase production of commodities and to satisfy the material wants; (3) Political representatives in office are there for the benefit of people and their country and only they have the capacity to handle policies that effect society as a whole (Fig 1, Sociologic model).

Many thinkers are supporting and still more are questioning it (Foster, 1999; Kilborne et al., 2002; Devall, 2007; Рубанова, 2007, Яницкий, 2006).

Devall (2007) represented two views on human-nature interactions – that of reformist environmentalism (shallow ecology), which preserve DSP and that of revolutionary (deep ecology), which seeks a new metaphysics, epistemology, cosmology and environmental ethics of person/planet system. He formulated 15 principles of deep ecology view, which mark the main parameters of a new social paradigm.

Dunlap & Van Liere (1978) recognized the limits of HEP and DSP and suggested a new perspective that took environmental variables into fuller

account in the New Ecological Pyramid (NEP). Jones[11] represents visually the relations between the different paradigms (Fig 1, NEP).

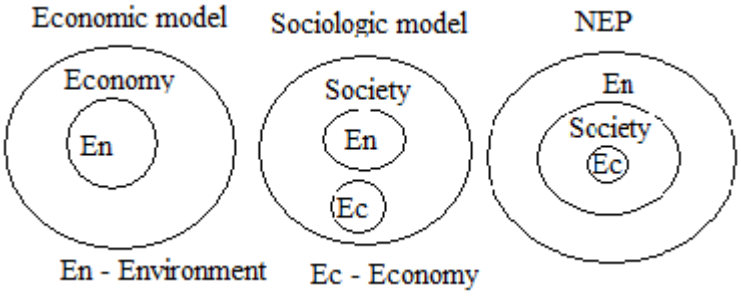

Fig 1. Different visual representations of the models of human-environment relation

According to NEP people have innovative capacity but are still ecologically interdependent as with other species. Social and cultural forces have their significant roles but that does not mean social determinism. NEP seeks environmental protection and procurement through limitations on industrial and population growth. It recognizes the detrimental effect of human-influenced interactions with their surrounding natural landscape.

Humans are impacted by the cause, effect and feedback loops of ecosystems (Dunlap & Catton, 1994) and the biophysical environment can impose constraints on human activity because the earth has a finite level of natural resources and waste repositories (Fig 2).

Carrying capacity denotes the number of individuals who can be supported in a given area within natural resource limits without degrading it for present and future generations.[17] It is not fixed and can be altered by the use of improved technology but mostly the change is for the worse. The growing population exercises the pressure because every member of the society requires resources and creates wastes. No population can live beyond the environmental carrying capacity for a long time. This is an ecological law, which cannot be altered by humans and should not be overlooked. Any

population exceeding the carrying capacity of the ecosystem is bound to collapse.

Catton &. Dunlap (1978) describe three competing functions of the environment. *Housing, transport systems, represents living space function* all ecological factors that make suitable living conditions for humans. Overuse and crowding bring destruction of habitats of other species and of man himself. *Supply depot function* denotes the amount of renewable and non-renewable resources (water, forests, fossil fuel, etc.) available for humans from the earth. *Waste repository function* views the environment as a sink for garbage (rubbish), sewage, industrial pollution and other by-products. Overuse exceeding the carrying capacity results in health problems. The three competing functions of the environment describe the ecological basis of environmental destruction very well. Each of these functions competes for space impinging upon the others. The model expands human ecology beyond the exclusive concern of living space (urban ecology) to the environmentally relevant functions of supply and waste disposal. It has a time dimension, which shows the deepening of the crisis, and besides it accounts for a visible practical situation.

Both DSP and NEP represent the vast majority of people within the world. More than three decades of their existence accompanied by research and discussions have not brought the two views to a consensus on the proper route to take in order to resolve environmental issues and no one expects that all arguments will come to fruition.[16)]

NEP is supported by the theory of reflective modernization that answers the problems of second modernity as distinguished from post-modernity (Beck & Grande, 2010). While post-modernity deals with deconstruction only, second modernity is interested in both deconstruction and reconstruction of new concepts to understand the world dynamics at the beginning of 21st century. Reflexive modernity means to modernize the foundations and address the problems of the new reality, posed for individual

and collective decisions and the problems that arise from these decisions for the theory (Beck, 1992).

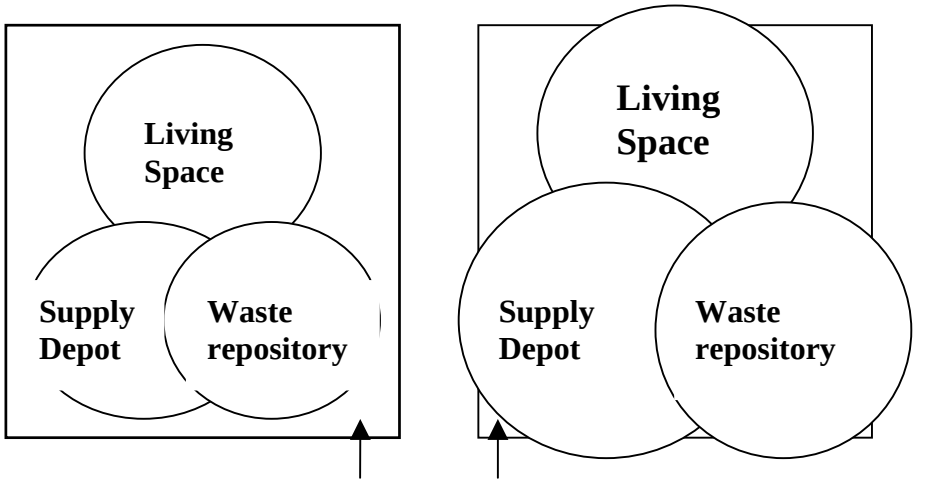

Fig 2. Competing functions of the environment: a) 1900; b) current situation (Hannigan, 2006).

Beck′s model (Fig 3) considers the relationship of modern industrial society to the resources of nature and culture on the existence of which it is constructed but which are being dissipated in the wake of a fully established modernization. Society creates threats and problems, which exceed the foundations of social ideas of safety, and people, having become conscious of them, are apt to shake the fundamental assumptions of the conventional social order. It is a problem of business, law, science and a particular problem of political action and decision-making. Collective and group-specific sources of meaning in industrial society culture, such as classes consciousness and faith in progress, are suffering from exhaustion, break up and disenchantment. In the global risk society an individualized process starts with a different meaning. Individuals have to rely exclusively on themselves for perceiving, interpreting and handling opportunities and threats. They can no longer rely on family, village community, social class or group. Individuals have to make

decisions without being able to consider the possible consequences owing to the complexity of modern society.

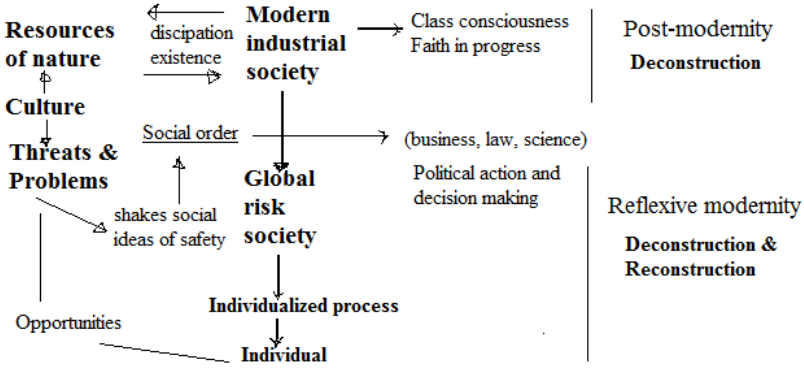

Fig 3. A model of reflexive modernization in global risk society based on Beck′s theory

People become aware of the necessity of a new reflexive self-determination only within the concept and in the perspective of a risky society. Social conflicts are no longer treated as problems of order but as problems of risk. Participation in work presupposes participation in education and both presuppose mobility and readiness to be mobile. The risky society requires expansion of education, strong demands for mobility in the labor market, advanced juridification of labor relationships.[13)] The individual is the subject of entitlement and obligations and is called upon to plan, understand, design and act in order to avoid the consequences in case of failure, which will be self-inflicted. This once again brings us to the necessity and the priority of environmental education of each individual to make him or her aware of and reflective upon everybody′s responsibilities for the state of the environment. That is why the interest in the scales for measuring environmental concern is so wide. There are hundreds of EA measures available, based on different conceptual and theoretical frameworks, but most of the researchers prefer to

generate new measures (Table 1). That increases the multiplicity of thought and understanding of attitudes but hinders comparative assessment and evaluation.

Table 1. Some assessment instruments of ecological attitudes (EA) and knowledge

Author	Assessed aspects
Maloney et al., 1975	**The Ecology Scale**. A scale consisting of 4 subscales: Verbal commitment (10 items), Actual commitment (10 items), Affect (10 items) and Knowledge (15 items).
Weigel & Weigel, 1978	**The Environmental Concern Scale**. A 17 items scale consisting of 4 subscales measuring environmental optimism, the relative importance of environmental issues compared to economic and technological progress, attitudes towards specific environmental issues and personal impacts.
Dunlap & Van Liere (1978)	**The New Ecological Paradigm.** A 12 item scale measuring respondents′ attitudes towards ecological issues from human influence on the balance of nature, limits to growth on the human population size and whether humans should have dominance over nature.
Synodinos, 1990	Assessment of business students' verbal commitment, actual commitment, affect and knowledge about environmental issues. Environmental values neglected in business curricula. (Uses The Ecology Scale – Maloney et al, 1973)
Chan, 1996	A questionnaire of three parts: general environmental attitudes (11 items), behavioral intentions (4 items) using 5-point Likert scale and major sources of environmental information for students).
Keiser, 1998	Three types of ecological behavior measures applied: a general measure, 3 multiple-item measures and 3 single-item measures. Probabilistic measurement approach.
Kuhlemeier et al., 1999	Environmental knowledge, attitudes and behavior in Dutch secondary education: positive attitude to the environment. Actual behavior is regarded as a function of behavioral intentions and attitudes that in turn are affected by knowledge.
Dunlap et al., 2000	**The New Ecological Paradigm Scale.** A revised NEP scale, designed to improve upon the original one (1978) in several respects. Measure three dimensions: balance of nature, limits to growth and human domination of nature. All psychometric properties assessed.
Henry, 2000	Observation (150 individual) and a field journal for recording comments, questions and other narrative accounts of the *visitors* to Smithsonian institution exhibit on global warming, energy consumption, the greenhouse effect, etc.
Stern et al., 1992	Survey of dimensions of human responses: 1. Experienced versus anticipated change; 2. Deliberate responses versus actions with incidental effects.
Krosnick et al.,	Assessment of Thought & Knowledge → Beliefs → Attitudes

2006	→Behavior; Cognitive processes that form public judgments of environmental problem seriousness; causes of existence beliefs, causes of attitudes, causes of certainty.
Dutcher et al., 2007	Survey using five questions on environmental activism and cultural bias (5-point Likert scale). Environmental connectivity scale, Environmental behavior scale and Environmental concern scale. Assessment of Land owner's attitudes.
Kostova, Atasoy, 2008	Comparative evaluation of environmental culture of 8th grade students from Bulgaria and Turkey, using direct self-report technique with a questionnaire, containing 40 terms. Effect of social status and school entrance exams assessed.
Erdogan, 2009	Use of the revised NEP scale (Dunlap, 2000) with 15 items (5-point Likert scale); socio-demographic variables (gender, school status, socio-economic status);
Negev et al., 2010	Environmental literacy assessment with multiple choice and open-ended questions on problems, causes and solutions. Main environmental issues: solid wastes, open spaces and air pollution. Perceived solutions at the governmental level.
Milfont & Duckitt, 2010	**The Environmental Attitude Inventory** (EAI) with 12 specific scales is established through confirmatory factor analysis. Direct self-report methods are used. Structure of environmental attitudes – cognitive, affective and behavioral components, value analysis. Horizontal and vertical structure of EA.

NEP is the most frequently used measure of environmental concern and is widely acknowledged as a reliable multiple-item scale for environmental attitudes. It has been used for more than 30 years by psychologies, political scientists, sociologies and geographers but criticism is addressed to its theoretical foundations that is considered not to be comprehensively specified. The forms of anthropocentrism are well captured by the scale but "crucial elements of environmental ethics debate" are missing (Carina, 2007). It has not been placed in the context of a social-psychological theory of attitude formation or attitude-behavior relationship (Stern et al., 1992). It does not account for the specific context of the different communities (Erdogan, 2009). Nevertheless this ecological attitude assessment scale is easy to apply and work out, possesses the necessary psychometric properties and has not been replaced by a better one so far.

The longitudinal features of the Catton & Dunlap′s model have some similarities with Beck′s reflective modernization model (Hannigan, 2006) and

with revolutionary views of deep ecologists (Devall, 2007; Eduards et al., 2006)

The first version of NEP (1978) is a 12 Likert items scale, focused on water pollution, loss of aesthetic value and resource conservation. It surveys beliefs about humanity′s ability to upset the balance of nature, the existence of limits to growth for human societies and the humanity′s right to rule over the rest of nature. Its characteristics, such as group validity, predictive validity, criterion validity, content validity, construct validity, were investigated and found reliable. The revised second version of NEP – New Ecological Paradigm Scale (Dunlap et al., 2000) focuses on pollution hazardous wastes, ozone depletion, deforestation, loss of biodiversity, climate changes on a global level (Stern et al., 1992). It takes into account the fact that the environmental impact of local activities has global effects on the planet. It is composed of three distinct dimensions as the first version: balance of nature, limits to growth and human dominance of nature and can be used as a single scale or as multidimensional measure. It has 15 polar statements of Likert items scale, internally consistent instrument, measuring commitment to DSP and NEP. The items are constructed as follows: a) The reality of limits to growth -1, 6, 11 items; b) Anti-Anthropocentrism - 2, 7, 12 items; c) The fragility of nature′s balance - 3, 8, 13 items; d) Rejection of exemptionalism – 4, 9, 14 items; e) Possibility of an eco-crisis - 5, 10, 15 items.

The Questionnaire includes pro- and anti NEP statements. In the seven even numbered items (2, 4, 6, 8, 10, 12, 14) disagreement indicates pro-ecological view, while in the eight odd numbered items (1, 3, 5, 7, 9, 11, 13, 15) agreement indicates pro-ecological view. SA – strongly agree, MA – mildly agree, U – unsure, MD – mildly disagree. SD – strongly disagree. The higher the NEP scores, the more likely the problems are seen as serious. The NEP scale measures a wide range of ecological attitudes and behaviors.

Practical framework

Students, assessed in the investigation live and study in the town of Dupnitsa, situated in southwestern Bulgaria in the valley of middle Struma along the river Djerman. The beautiful mountainous and hilly scenery is severely affected by pollution and floods, especially in periods of heavy rains. The capacity of draining shafts is not enough to absorb all the rains water, which runs into people′s homes, underground garages and cellars. The situation becomes worse because of erosion of rivers banks, silting and throwing solid wastes in the river basin. Pollution from business, industry and households also increases. Trapped cars in the flooded areas block roads and cause traffic jam, which threatens human lives. Environmental values have been seriously neglected lately. Because of that assessment of environmental concern of students is important, as it is a first step in EE.

The current study should be of particular interest to the government, environmental groups, social organizations, universities, teachers, concerned individuals and any business companies incorporating environmental themes into their activities.

Using such a scale in schools gives information about the missing aspects of environmental education (EE), which should be attended properly on sound theoretical and practical grounds.

Research framework

The purpose of the study was to assess students` environmental attitudes using the revised NEP scale (Dunlap et al., 2000) in order to take measures for their improvement.

Study population and sample

The current study attempts to investigate the environmental attitudes of 76 nine-grade students (16 years of age), from three different specialties in one

secondary vocational school and make indirect conclusions about their environmentally responsible behavior. It took place in March and June of 2009. Industrial, commercial and domestic activities create global environmental problems, which cannot be solved by technology alone. Ecological crisis is the result of maladaptive human behavior. Therefore it is necessary to identify the factors that influence pro-environmental behavior in order to organize successful EE as through education of students, parents' knowledge and behavior can also be positively affected.

Attitude is considered one of most important influences on behavior. Judgments about the state of the environment are a function of beliefs about existence of ecological problems, attitudes towards them and the certainty with which these beliefs and attitudes are held. The Scale measures attitudes, certainty and existence beliefs as they are important factors for policy preferences with a special focus on environment protection. Attitudes are inferred from overt responses.

Method: A direct self-report method was used. A self-administered survey questionnaire was offered to students to collect the necessary data. The survey questionnaire was NEP translation in Bulgarian (Dunlap et al., 2000). Each student was allotted 30 minutes time to read the statements and to rate the extent to which they apply to him/her. The survey was repeated after a period of two months.

Mean scores and standard deviations for central tendency and frequency analysis for evaluation of distributions were used separately for each specialty and for the test and retest. Besides providing the percent and mean distributions for every item and specialty on the study scale, summary indexes were calculated in order to determine the overall environmental orientation. Two types of summary indexes were constructed: a) a summary distribution index for each item and for each of the three specialties; b) a summery distributions and means for each dimension of the scale. Reliability of the scale was determined by Pearson correlation coefficient of test and

retest. Means of pro-NEP (odd items) and pro-DSP (even items) were calculated. Each item was measured on a scale, ranging from 1 to 5. All pro-NEP responses were expected to be relatively high scores and all pro-DSP responses to be relatively low. The eight odd numbered items indicate pro-NEP attitudes and therefore responses were scored as 5 – strongly agree, 4 – mildly agree, 3 – undecided, 2 – mildly disagree and 1 – strongly disagree. The seven even numbered items indicate pro-DSP orientation; therefore the scores were reversed for them for the statistical analysis. The respondents comprised 34.21% of 9c class (electrical equipment), 31.58 % of 9a class (industrial electronics) and 34.21 % of 9b class (economics and management).

Results and discussion

The frequency distribution, mean scores and standard deviations for each item of the environmental concern scale are summarized in Tables 2 and 3.

Table 2. Frequency and mean distribution for NEPS items (9th grade[d]); Test; %

	Item[a]	SA	MA	U	MD	SD	Mean[b]	SD[e]
1	**We are approaching the limit of the number of people the earth can support**							
9c	Electrical equipment	5.88	23.53	17.65	47.06	5.88	2.76	1.06
9a	Industrial electronics	8.33	33.33	29.17	25.00	4.17	3.16	1.03
9b	Economics and management	77.27		13.63	4.55	4.55	4.36	0.91
∑	9c+9a+9b	31.75	19.05	20.63	23.81	4.76	3.49	1.28
2	**Humans have the right to modify the natural environment to suit their needs[c]**							
9c	Electrical equipment			17.65	52.94	29.41	4.17	0.68
9a	Industrial electronics	16.67	20.83	16.67	20.83	25.00	3.17	1.44
9b	Economics and management		4.55	4.55	18.18	72.72	4.59	0.78
∑	9c+9a+9b	5.56	8.46	12.95	30.65	42.38	3.96	1.18
3	**When humans interfere with nature it often produces disastrous consequences**							
9c	Electrical equipment	29.41	64.71		5.88		4.17	0.69
9a	Industrial electronics	50.00	37.50	12.50			4.37	0.69
9b	Economics and management	81.82	13.63			4.55	4.68	0.87
∑	9c+9a+9b	53.74	38.60	4.2	1.95	1.51	4.41	0.79
4	**Human ingenuity will insure that we do NOT make the earth unlivable[c]**							
9c	Electrical equipment	17.65	52.94	29.41			2.12	0.68

9a	Industrial electronics	16.67	20.83	45.83	4.17	12.5	2.75	1.17
9b	Economics and management	9.09	13.63	63.64	13.64		2.81	0.78
∑	9c+9a+9b	14.47	29.13	46.29	5.93	4.2	2.56	0.95
5	**Humans are severely abusing the environment**							
9c	Electrical equipment	47.06	29.41	5.88	11.77	5.88	4	1.24
9a	Industrial electronics	75	20.83	4.17			4.7	0.54
9b	Economics and management	54.55	40.90			4.55	4.4	0.89
∑	9c+9a+9b	58.87	30.38	3.35	3.92	3.48	4.38	0.98
6	**The earth has plenty of natural resources if we just learn how to develop them[c]**							
9c	Electrical equipment	64.70	17.65	5.88	11.77		1.64	1.03
9a	Industrial electronics	25	62.5	8.33	4.17		1.92	0.70
9b	Economics and management	27.27	27.27	22.74	13.63	9.09	2.5	`.03
∑	9c+9a+9b	38.99	35.80	12.32	9.86	3.03	2.02	1.09
7	**Plants and animals have as much right as humans to exist**							
9c	Electrical equipment	52.94	29.41	11.77	5.88		4.29	0.89
9a	Industrial electronics	70.83	20.83	4.17	4.17		4.58	0.76
9b	Economics and management	90.91	9.09				4.9	0.29
∑	9c+9a+9b	71.56	19.78	5.31	3.35		4.6	0.74
8	**The balance of nature is strong enough to cope with the impacts of modern industrial nations[c]**							
9c	Electrical equipment		5.88	23.54	64.70	5.88	3.7	0.49
9a	Industrial electronics		12.5	50	25	12.5	3.37	0.86
9b	Economics and management		4.55	45.45	18.18	31.82	3 .77	0.95
∑	9c+9a+9b		7.64	39.66	35.96	16.74	3.62	0.84
9	**Despite our special abilities humans are still subject to the laws of nature**							
9c	Electrical equipment	52.94	35.29	11.77			4.41	0.69
9a	Industrial electronics	54.17	41.66	4.17			4.5	0.58
9b	Economics and management	68.19	18.18	13.63			4.54	0.68
∑	9c+9a+9b	58.43	31.72	9.85			4.49	0.67
10	**The so called "ecological crisis" facing humankind has been greatly exaggerated[c]**							
9c	Electrical equipment	11.77	5.88	23.52	47.06	11.77	3.41	1.68
9a	Industrial electronics	4.17	20.83	25	41.67	8.33	3.46	1.07
9b	Economics and management			45.45	18.18	36.37	3.9	0.67
∑	9c+9a+9b	5.31	8.91	31.32	35.64	18.82	3.54	1.06
11	**The earth is like a spaceship with very limited room and resources**							
9c	Electrical equipment	29.41	35.29	11.77	17.65	5.88	3.64	1.31
9a	Industrial electronics	12.5	45.83	33.33	4.17	4.17	3.7	0.92
9b	Economics and management	54.55	4.55	18.18	18.18	4.55	3.86	1.36
∑	9c+9a+9b	32.16	28.56	21.09	13.33	4.86	3.70	1.19
12	**Humans were meant to rule over the rest of nature[c]**							
9c	Electrical equipment	5.88	11.77	11.77	47.06	23.52	3.7	1.13
9a	Industrial electronics	4.17	12.5	12.5	33.33	37.5	3.87	1.17
9b	Economics and management		4.55		36.36	59.09	4.5	0.55

∑	9c+9a+9b	3.35	9.61	8.09	38.91	40.04	4.03	1.09
13	**The balance of nature is very delicate and easily upset**							
9в	Electrical equipment	23.52	47.06	17.65	11.77		3.82	0.92
9г	Industrial electronics	12.5	41.66	29.17	16.67		3.5	0.91
9д	Economics and management	36.36	36.36	22.74		4.55	4	1.02
∑	9c+9a+9b	24.13	41.69	23.18	9.48	1.52	3.77	0.97
14	**Humans will eventually learn enough about how nature works to be able to control it[c]**							
9c	Electrical equipment	29.41	29.41	23.52	17.65		2.29	1.07
9a	Industrial electronics	16.67	20.83	29.17	16.67	16.67	2.96	1.29
9b	Economics and management		9.09	59.09	13.63	18.18	3.4	0.89
∑	9c+9a+9b	15.36	19.78	37.26	15.98	11.62	2.88	1.13
15	**If things continue on their present course, we will soon experience a major ecological catastrophe**							
9c	Electrical equipment	70.59	23.52			5.88	4.53	0.97
9a	Industrial electronics	62.5	29.17	4.17	4.17		4.5	0.76
9b	Economics and management	86.36		9.09		4.55	4.63	0.98
∑	9c+9a+9b	73.15	17.56	4.42	1.39	3.48	4.56	0.91

aSD = Strongly disagree, MD = Mildly disagree, U = Unsure, MA = Mildly agree, SA = Strongly agree;

bMean Likert scores after adjustment for direction. Higher score indicates pro-NEP worldview;

cPro-NEP worldview index for frequency distributions was calculated by allowing for the reversed direction of even-numbered items.

dN (number) of participants: 9c=26, 9a=24, 9b= 26

eSD (Standard Deviation)

Table 3. Frequency and mean distribution for NEPS items (9th grade[d]); Re-test; %

№	Item[a]	SA	MA	U	MD	SD	Mean[b]	SD
1	**We are approaching the limit of the number of people the earth can support**							
9c	Electrical equipment	42.30	34.62	11.54	7.69	3.85	4	1.09
9a	Industrial electronics	41.66	29.18	20.83	4.17	4.16	4	1.08
9b	Economics and management	46.15	26.92	15.38	7.69	3.86	4.03	1.13
∑	9c+9a+9b	43.37	30.24	15.91	6.52	3.96	4.03	1.11
2	**Humans have the right to modify the natural environment to suit their needs**							
9c	Electrical equipment	11.54	34.62	11.54	34.62	7.69	2.92	1.21
9a	Industrial electronics	16.70	25.00	20.83	29.15	8.33	2.87	1.24
9b	Economics and management		7.69	34.62	38.46	19.23	3.69	0.87

∑	9c+9a+9b	9.41	22.43	22.33	34.08	11.75	3.16	1.18
3	**When humans interfere with nature it often produces disastrous consequences**							
9c	Electrical equipment	53.85	26.92	15.38	3.85		4.3	0.87
9a	Industrial electronics	37.50	37.50	8.33	8.33	8.33	3.87	1.24
9b	Economics and management	50.00	42.31			7.69	4.26	1.06
∑	9c+9a+9b	47.12	35.58	7.90	4.06	5.34	4.15	0.92
4	**Human ingenuity will insure that we do NOT make the earth unlivable**							
9c	Electrical equipment	23.08	19.23	38.46	3.85	15.38	2.69	1.3
9a	Industrial electronics	16.6	33.30	37.50	4.17	8.33	2.54	1.03
9b	Economics and management	3.85	38.46	53.85	3.85		2.57	0.63
∑	9c+9a+9b	14.51	30.34	43.27	3.96	7.92	2.6	1.05
5	**Humans are severely abusing the environment**							
9c	Electrical equipment	57.69	38.46	3.85			4.53	0.57
9a	Industrial electronics	50.00	50.00				4.5	0.50
9b	Economics and management	61.54	23.07	7.69		7.69	4.3	1.14
∑	9c+9a+9b	56.41	37.18	3.85		2.56	4.45	0.79
6	**The earth has plenty of natural resources if we just learn how to develop them**							
9c	Electrical equipment	38.46	46.15	7.69	7.69		1.84	0.86
9a	Industrial electronics	41.66	33.30	12.50	8.33	4.17	1.99	1.17
9b	Economics and management	42.31	42.31	7.69	7.69		1.81	0.88
∑	9c+9a+9b	40.81	40.58	9.30	7.91	1.40	1.88	0.97
7	**Plants and animals have as much right as humans to exist**							
9c	Electrical equipment	42.31	38.46	11.54	7.69		4.15	0.91
9a	Industrial electronics	54.17	33.33	8.33	4.17		4.38	0.81
9b	Economics and management	61.53	34.62			3.85	4.5	0.84
∑	9c+9a+9b	52.67	35.48	6.62	3.95	1.28	4.34	0.87
8	**The balance of nature is strong enough to cope with the impacts of modern industrial nations**							
9c	Electrical equipment	3.85		42.31	30.77	23.07	3.69	0.95
9a	Industrial electronics		8.33	37.50	33.33	20.83	3.67	0.90
9b	Economics and management			26.92	57.69	15.38	3.88	0.64
∑	9c+9a+9b	1.28	2.77	35.58	40.60	19.77	3.74	0.85
9	**Despite our special abilities humans are still subject to the laws of nature**							
9c	Electrical equipment	50.00	38.46	11.54			4.45	0.76
9a	Industrial electronics	45.83	45.83	4.17	4.17		4.38	0.63
9b	Economics and management	46.15	46.15	7.69			4.38	0.68
∑	9c+9a+9b	47.33	43.48	7.8	1.39		4.4	0.69
10	**The so called "ecological crisis" facing humankind has been greatly exaggerated**							
9c	Electrical equipment	7.69	11.54	19.23	26.92	34.62	3.69	1.27
9a	Industrial electronics	4.17	12.50	37.50	29.16	16.66	3.42	1.06
9b	Economics and management		7.69	7.69	26.92	57.69	4.35	0.92
∑	9c+9a+9b	3.95	10.57	21.47	27.66	36.32	3.82	1.15
11	**The earth is like a spaceship with very limited room and resources**							
9c	Electrical equipment	30.77	26.92	19.23	15.38	7.69	3.58	1.28
9a	Industrial electronics		54.17	12.50	20.83	12.50	3.08	1.12
9b	Economics and management	19.23	57.69	15.38	3.85	3.85	3.85	0.91
∑	9c+9a+9b	16.67	46.26	15.71	13.35	8.01	3.5	1.16
12	**Humans were meant to rule over the rest of nature**							
9c	Electrical equipment		11.54	11.54	30.77	46.15	4.12	1.01

9a	Industrial electronics	4.17	12.50	25.00	45.83	12.50	3.5	1.00
9b	Economics and management		11.54	3.85	23.08	61.53	4.35	1.00
∑	9c+9a+9b	1.39	11.86	13.46	33.23	40.06	3.99	1.07
13	**The balance of nature is very delicate and easily upset**							
9c	Electrical equipment	15.38	42.31	23.08	11.54	7.69	3.46	1.12
9a	Industrial electronics	12.50	54.17	20.83	12.50		3.67	0.85
9b	Economics and management	30.77	53.85	11.54	3.85		4.12	0.75
∑	9c+9a+9b	19.55	50.11	18.48	9.30	2.56	3.75	0.96
14	**Humans will eventually learn enough about how nature works to be able to control it**							
9c	Electrical equipment	7.69	23.08	34.62	30.77	3.85	3.00	1.00
9a	Industrial electronics	20.83	20.83	29.17	20.83	8.33	2.75	1.23
9b	Economics and management		3.85	26.92	53.85	15.38	3.8	0.73
∑	9c+9a+9b	9.51	15.92	30.24	35.15	9.18	3.18	1.11
15	**If things continue on their present course, we will soon experience a major ecological catastrophe**							
9c	Electrical equipment	76.92	19.23			3.85	4.65	0.83
9a	Industrial electronics	66.67	25.00	8.33			4.58	0.64
9b	Economics and management	84.62	3.85	3.85		7.69	4.58	1.07
∑	9c+9a+9b	76.07	16.03	4.06		3.84	4.60	0.89

The results indicate that the respondents in the two successive studies showed positive environmental attitudes. The mean scores ranged from 1.88 to 4.6 on a five-point scale. Students scored 65% strong and mild attitude on the test and 64.4% on the re-test. Those of them studying economics and management scored higher than the other two specialties on both test and re-test. Students scored highest and showed strong attitude on conservation of plants and animals (mean 4.6 on test and 4.34 on re-test. High scores (mean 4.41 and 4.38 on test and 4.15 and 4.45 on re-test) they demonstrated on items 3 and 5 respectively, agreeing on the disastrous effects of human interference with nature. Strong ecocentric attitudes are demonstrated on item 9 in both tests (mean 4.49/4.37) proving their understanding of humans as members of an ecosystem as all other living things. Three items with the lowest mean scores were attitudes on unlimited resources of the earth (item 6, mean 2.02/ 1.88 respectively), on trust in human ingenuity (item 4, mean 2.56/2.6 respectively) and on the abilities of humans to control nature (item 14, mean 2.88/ 2.38 for test/retest respectively). The lower mean scores are due to a high proportion of students, showing uncertainty.

The NEP scale is multidimensional and the attitudes vary depending on the particular dimension. The students least understood the first dimension, limits to population growth. They did not accept that the human population growth is approaching the carrying capacity of the biosphere (Tables 4 and 5). One reason for that may be the fact that the town of Dupnitsa is not overpopulated, another – because many people left the country as well as their houses empty and went abroad to earn their living, and still other, because the population growth curves and the carrying capacity concepts are not well represented in the ecology topics of the school curricula. The scarcity of natural resources is also unclear to students. Apparently they have great trust in science and expect scientists to discover new ways of using nature (technocentrism). The model of the earth as a spaceship was unclear for them and difficult to grasp. The unintended side effects and domination of power shaped by the globalization of capital and risks at the beginning of 21st century are concepts beyond students grasping. They still have to think about the finite level of natural resources and the constraints of biophysical environment on human activity. But the inequity and inequality of human use of natural resources and other values of nature should also be considered as explanation of the results.

Table 4. Frequency and mean distribution for **Limits to Growth**; Test; %

Q	Assessed groups	SA	MA	U	MD	SD	Mean	SD
1	9c+9a+9b	31.75	19.05	20.63	23.81	4.76	3.49	1.28
6	9c+9a+9b	38.99	35.8	12.32	9.86	3.03	2.02	1.09
11	9c+9a+9b	32.16	28.56	21.09	13.33	4.86	3.70	1.19

Table 5. Frequency and mean distribution for *Limits to growth*; Re-test; %

Q	Assessed groups	SA	MA	U	MD	SD	Mean	SD
1	9c+9a+9b	43.37	30.24	15.91	6.52	3.96	4.03	1.11
6	9c+9a+9b	40.81	40.58	9.30	7.91	1.40	1.88	0.97
11	9c+9a+9b	16.67	46.26	15.71	13.35	8.01	3.5	1.16

Frequency and mean distribution of environmental attitudes concerning *anti-anthropocentrism* (Tables 6 and 7) are acceptable and indicate that students did not look upon humans as rulers over nature (item 2) and cared for the protection of plants and animals (item 7). A greater part of them did not think that humans should have the right to modify the earth (item 12). This conviction may be due more to the indescribable beauty of the mountain around their town and its proximity than to education in school. They probably sensed that humans were embedded in the ecosphere and evolved alongside other species than consciously understood it. Their ecological consciousness was on the way of development but had not reached the expected functional level. What was obvious from their responses was the idea that nature was not created for the benefit of man only.

Table 6. Frequency and mean distribution for *Anti-Anthropocentrism;* Test; %

Q	Assessed groups	SA	MA	U	MD	SD	Mean	SD
2	9c+9a+9b	5.56	8.46	12.95	30.65	42.38	3.96	1.18
7	9c+9a+9b	71.56	19.78	5.31	3.35		4.6	0.74
12	9c+9a+9b	3.35	9.61	8.09	38.91	40.04	4.03	1.09

Table 7. Frequency and mean distribution for *Anti-Anthropocentrism;* Re-test; %

Q	Assessed groups	SA	MA	U	MD	SD	Mean	SD
2	9c+9a+9b	9.41	22.43	22.33	34.08	11.75	3.16	1.18
7	9c+9a+9b	52.67	35.47	6.62	3.95	1.28	4.34	0.87
12	9c+9a+9b	1.39	11.86	13.46	33.23	40.06	3.99	1.07

Students' attitudes on the delicate nature of the *ecological balance* were highly positive (Tables 8 and 9). They considered the disastrous effects of human activities on ecological equilibrium (item 3), the ever growing industrial load on it (item 8) and the unpredictable consequences of its change (item 13). Other species should have the right to perform their own evolutionary history. Man is an integral part of nature, not over, or apart from it. The fragility of nature lies in its long evolution, which resulted in the complex entity of the biosphere. There is "wisdom in the stability of natural processes unchanged by human intervention. Massive human-induced disruptions of ecosystems will be unethical and harmful to man-design for human settlement should be with nature, not against nature" (Devall, 2007).

Table 8. Frequency and mean distribution for *Fragility of nature's balance;* Test; %

	The fragility of nature's balance Test (N=76)							
Q	Assessed groups	SA	MA	U	MD	SD	Mean	SD
3	9c+9a+9b	53.74	38.60	4.2	1.95	1.51	4.41	0.79
8	9c+9a+9b		7.64	39.66	35.96	16.74	3.62	0.84
13	9c+9a+9b	24.13	41.69	23.18	9.48	1.52	3.77	0.97

Table 9. Frequency and mean distribution for *Fragility of nature's balance;* Re-test; %

Q	Assessed groups	SA	MA	U	MD	SD	Mean	SD
3	9c+9a+9b	47.12	35.58	7.90	4.06	5.34	4.15	0.92
8	9c+9a+9b	1.28	2.77	35.58	40.60	19.77	3.74	0.85
13	9c+9a+9b	19.55	50.11	18.48	9.30	2.56	3.75	0.96

Human exemptionalism did not appeal to students very much. They positively moved to ecocentrism (Tables 10 and 11). A considerable part of them showed uncertainty, which was supported by the strong beliefs in human intellectual abilities and in the benefits of learning and understanding natural

laws. That human beings have special attributes that make them different from other species should not and cannot be denied and that they are the products of both biological and social evolution either. The significant point here is the responsibility of humans for the maintenance of ecological equilibrium. That was not clearly understood by the majority of students and they overestimated the role of technology, moving closer to DSP. Nevertheless they did not place humans above the laws of nature that demonstrated their hesitation and indecision between DSP and NEP. From students in this college we expect strong ecological attitudes because in their future professions they should responsibly interact with other components of the ecosystem.

Table 10. Frequency and mean distribution for *Rejection of exemptionalism*; Test; %

Q	Assessed groups	SA	MA	U	MD	SD	Mean	SD
4	9c+9a+9b	14.47	29.13	46.29	5.93	4.2	2.56	0.95
9	9c+9a+9b	58.43	31.72	9.85			4.49	0.67
14	9c+9a+9b	15.36	19.78	37.26	15.98	11.62	2.88	1.13

Table 11. Frequency and mean distribution for *Rejection of exemptionalism;* Re-test; %

Q	Assessed groups	SA	MA	U	MD	SD	Mean	SD
4	9c+9a+9b	14.51	30.34	43.27	3.96	7.92	2.6	1.05
9	9c+9a+9b	47.33	43.48	7.8	1.39		4.4	0.69
14	9c+9a+9b	9.51	15.92	30.24	35.15	9.18	3.19	1.11

The attitudes on the high probability of ecological catastrophe were very strongly positive (Tables 12 and 13). First, the pollution of their surroundings, the degradation of the ecosystems and the diminishing quantity and quality of biodiversity, taking place before their eyes convinced them in the existence of heavy ecological problems. Besides that, they experienced the disastrous effects of human activity during the heavy floods, affecting their homes. Secondly the school learning contents emphasized the problems of pollution and nature degradation. They did understand that modern society is

unsustainable but could not accept the idea that economic growth should come to a standstill due to ultimate limits of resources and that limits to population growth have to be considered. They were more inclined to ideological but not to science-driven analysis. Finally the views of a considerable part of them supported the treadmill of production. Poverty and ignorance are much greater causes to destruction. Economics must be subordinate to ecological ethical criteria and that is quite possible as Humans are the only living things on Earth that create values. In modeling the future EE more attention should be given to the rate of population growth, which for some ethnical groups is beyond understanding. "Optimal carrying capacity should be determined for the planet as a biosphere and reduction of the rate of growth of population of Homo sapiens through humane birth control programs is required" (Devall, 2007).

Table 12. Frequency and mean distribution for *Possibility of an eco-crisis;* Test; %

Q	Assessed groups	SA	MA	U	MD	SD	Mean	SD
5	9c+9a+9b	58.87	30.38	3.35	3.92	3.48	4.38	0.98
10	9c+9a+9b	5.31	8.91	31.32	35.64	18.82	3.54	1.06
15	9c+9a+9b	73.15	17.56	4.42	1.39	3.48	4.56	0.91

Table 13. Frequency and mean distribution for *Possibility of an eco-crisis;* Re-test; %

Q	Assessed groups	SA	MA	U	MD	SD	Mean	SD
5	9c+9a+9b	56.41	37.18	3.85		2.56	4.45	0.79
10	9c+9a+9b	3.95	10.57	21.47	27.68	36.33	3.82	1.15
15	9c+9a+9b	76.07	16.03	4.06		3.84	4.60	0.89

The reliability of the test was measured by means of Pearson's coefficient comparing the results from the test and the re-test with the elapse of two months between them (Table 14).

Table 14. Reliability and mean distribution for the different dimensions of Test/Re-test

Items (Test – Re-test)	1, 6, 11	2, 7, 12	3, 8, 13	4, 9, 14	5, 10, 15	r^t Total
r – reliability coefficient	0.98	0.78	0.77	0,92	0.96	0.88
Mean Test/Re-test	3,07/3.14	4.2/3.83	3,93/3.88	3.31/3.39	4.16/4.29	3.73/3.71

More than 1/3 of the respondents scored very strong attitudes on the items (Table 15). Another third scored mildly agree. One fifth of the respondents showed uncertainty and were not able to make right decisions. The low mean scores on the even items (Table 5, columns 7 and 8) showed that students were not very well instructed about the structure of the items and that it was difficult for them to invert the way of marking the answers. This indicates that they were not adapted to such kind of thinking and were confused.

Table 15. Frequency and mean distribution for Test and Re-test;

Tests	SA%	SD%	MA%	MD%	U%	Mean odd	Mean even	Mean total
Test	36	6.5	29	10.4	18.1	4.18	3.23	3.71
Re-test	32.5	7.5	31.9	10.8	17.3	4.15	3.20	3.68

Students studying economics and management showed little higher positive environmental attitudes (Table 16).

Table 16. Mean distribution for the different specialties of Test and Re-test

Assessed groups	9c	9a	9b	Mean
Test	3.51	3.63	4.06	3.73
Re-test	3.67	3.55	3.90	3.71
Mean	3.59	3.59	3.98	3.72

There are a number of limitations to the study: 1) the sample used is small, not representative of the Bulgarian population and includes students from one age group; 2) students are assessed in the school; 3) assessment is only verbal; 4) not all aspects of human environmental attitudes are included in the scale and additional scales should be constructed to account more precisely to the aims of the study.

"Education should have as its goal encouraging the spiritual development and personhood development of the members of a community, not just training them to occupations appropriate for oligarchic bureaucracies and for consumerism in advanced industrial societies" (Devall, 2007).

The total rejection of classical Marxism's ecological concerns, dominating environmental sociology throughout the totalitarian period stimulated nature degradation and resources depletion ideologically. K. Marx provided a powerful economic analysis of the main ecological crisis of his days, which can help contemporary ecologists to understand the present ecological situation (Hunnigan, 2006; Elwell, 2009; Foster, 1999, 2006). The political economy explanation does not take into account the ecological basis of environmental destruction. The rate of unplanned establishment of market economy, accumulation of industrial capital and material growth of the ruling elite brought severe environmental destruction in the late twenty years in our country and made the activity of the green social movements very difficult. The increase of welfare and the increase of hazards mutually condition one another, which requires both environmental protection and economic growth to come into terms. As Mahatma Gandhi states: "Earth provides enough to satisfy every man's need, but not every man's greed."

For future research and education in this school and in other secondary schools as well it is necessary to introduce an improved model of EE for students, which places a greater emphasis on ecological knowledge, attitudes and behavior. More attention should be given to practical and interactive learning techniques and on new information technologies including CAL.

Many aspects of the impact of the twin processes of democratization and marketization on the environment under heavy economic crisis have not been attended yet (Beker & Jehlicka, 1998).

Conclusions

Based on the analysis of the studied authors, we accepted the NEP scale as an appropriate to measure the environmental concerns of students before designing a new model for EE in a vocational school. It reflects the main worldviews, both historically and contemporary in environmental sociology. The results and discussions proved it as a valuable instrument for assessing prior knowledge and attitudes to EE.

The analysis of results proved the very complex nature of environmental attitudes, their dependence on DSP, which gives priority to anthropocentrism. The vast array of world environmental views and the support they receive from society, media and the power elite confuse students and they sway between ecological sciences and necessities of everyday life, between nature's requirements and personal requirements, which often come into conflicts. Causes for environmental degradation are complex and synergistic and solutions are complicated. Students tried to maneuver this complexity by replacing strong attitudes with uncertainty, acting on the side of caution. They had not fully understood the fact that the environmental impact of local activities has global effects on the planet. It is not fully understood by society either, which has not dwelt consciously enough on the views of the cosmopolitan modernity theory and contemporary risks. Nevertheless students demonstrated positive attitudes to their environment, which is due to education.

Knowledge does not instantly turn into beliefs, attitudes and behavior. Ecologically attitude directed learning should come in terms with human cognitive architecture and should employ learning by doing, new information technologies and reflective discussions. Some improvements of school

curricula, placing greater emphasis on the ecological concepts and their relations to everyday life and on the new interactive constructivists teaching strategies, are strongly required. More attention should be given to the link between knowledge, beliefs, attitudes, values and behavior. It is also interesting to know how environmental attitudes develop from kindergarten to adulthood and which teaching and learning strategies are most beneficial.

Learning strategies of ecology should be changed so that students learn from the book of nature and from real life and not only from textbooks and lectures. Systematic assessment of students` attitudes and development of practical skills should also be taken into account.

NOTES

1.http://www.answers.com/topic/environmentalism

2.http://www.wetland.org/educationhome.htm

3.http://www.answers.com/topic/cultural-movements-events-and-institutions-related-word-list

4.http://www.answers.com/library/Political%20Dictionary-cid-27010

5.http://www.answers.com/library/Geographical1%20Dictionary-cid-27010

6.http://www.northwestern.edu/ipr/publications/papers/2004/schnaiberg/17_TreadmillEnvirState.pdf Schnaiberg, A., Pellow, D. & Weinberg, A. (2000). The treadmill of production and the environmental state.

7.http://www.bookrags.com/research/ecology-history-of-plsc-02/ Information about E. Haeckel`s definition

8.http://www.gennet.org/facts/haeckel.html Ernst Haeckel

9.http://www2.hmc.edu/~tbeckman/essays/position.htm Beckman, T. *What is an environmental philosophy.*

10.http://www.scribd.com/Political-ScienceDefinition-and-Scope/d/5359107 Political science definition and scope

11.http://www.slideshare.net/leafwarbler/socio-ecological-systems Jones, A. R. *Socio-ecological systems. Moving beyond the human exemptionalist paradigm.*

12.http://www.faculty.rsu.edu/~felwell/Theorists/Foster/Presentation/Foster.pdf

13.http://www.sv.uio.no/arena/english/research/publications/arena-publications/workingpapers/working-papers2005/wp05_14.pdf (Blichner, L. C. & Molander, A. (2005) *What is juridification?*

14.http://www.cnr.uidaho.edu/for235/Pdf/Fall%202008/NEP-F08.pdf New ecological paradigm survey report

15.http://www.vostokoved.ru/socio/86-haliy.html Халий, И.А. *Трансформация доминирующих социальных парадигм*

16.http://apus.academia.edu/KristinJackman/Papers/161044/Dominant_Social_Paradigm_v._New_Environment_Paradigm

17.http://www.springerlink.com/content/wg70k8q00q45351g/fulltext.pdf V. I. Vernadsky

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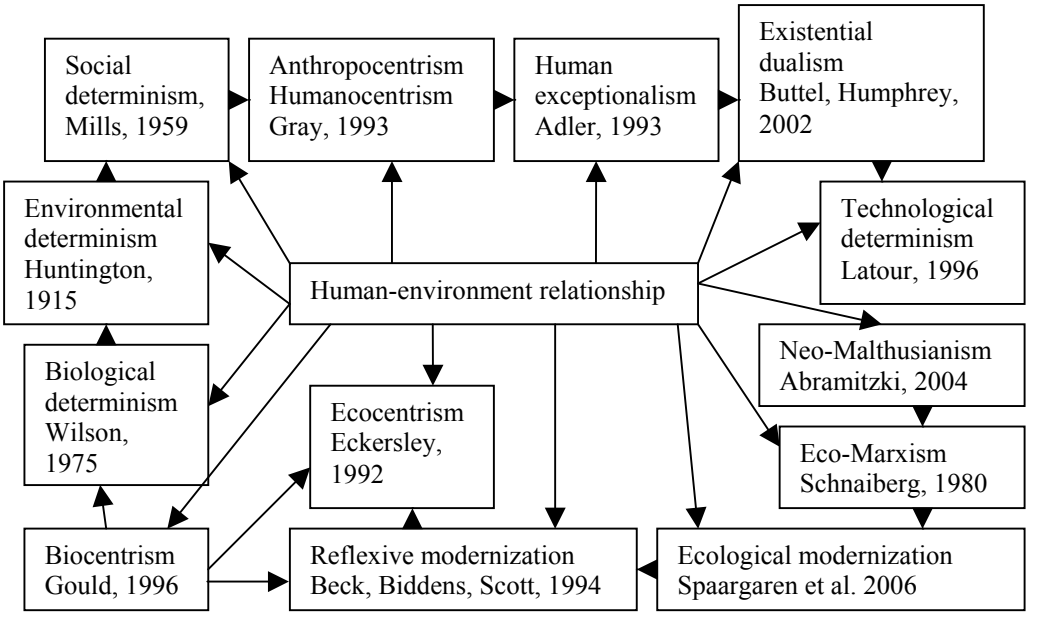
APPENDIX: World sociological views on human-environment relationship



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