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ENVIRONMENTAL SCIENCES IN THE CURRICULUM FOR LOCAL COMMUNITY DEVELOPMENT

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ABSTRACT: In Romania, in the rural areas, the curriculum of high school level can be related to the local community's necessities and interests, but also to the local resources through the segment of the *curriculum for local community development*. We present our school experiences in this field, using like case study the educational module of *Pollution and environmental protection in the rural area*. This course is designate for the students from classes of technology high schools. The scientific component of the education through this course follows to assess the quality of air, soil and waters in our villages, learning about pollution's impact on organisms' health and ecosystems' functions, to identify and elaborate a monitoring scheme for the local pollution sources, but also to develop a control system of environmental qualities, to implement mechanism to reduce the pollution impact and to improve the quality of environmental parameters in our villages.

About 50% of classes are rolled outside of classroom, like fieldwork activity in the school's vicinity but also in different points inside the villages and in its vicinity. The evaluation process using individual working sheets, but also team working projects on topics related to pollution problems in our villages' area.

Keywords: Environmental sciences, curriculum, local community, school.

INTRODUCTION

The national curriculum in the Romanian pre-university public education system comprises one *curriculum nucleus* representing 70% from the national curriculum and a *curriculum on the school's decision* that represent the rest of 30%. The first one represents the base for different evaluation types, including the national exams, but also for the elaboration of curricular standards of performance, existing one official methodology guide for each obligatory curricular area, including for *Mathematics & Natural Sciences*. The second one gives opportunities for one more particular and personalized educational offer in schools.

In Romania, in the rural areas, the curriculum of high school level can be related to the local community's necessities and interests, but also to the local resources through neither the segment of the *curriculum for local community development* in order increase nor only the level of education, but also the general level of welfare for the whole community.

In the general context of environmental crisis problem, the common level of knowledge in ecology, pollution, natural resources' exploitation and biodiversity management is still one low, especially in the rural areas. This was one reason for our school to create a new education specialisation – *technician in ecology and environmental quality assessment*. The curriculum for this specialisation comprises seven educational modules and provides scientific training and support, so, our graduates will hold an overview on the complexity of environmental issues and interest of economic development, will be able to understand and analyse different environmental problems, acquiring the methodology of solving these problems and to develop strategies for intervention and manage its. This curriculum permits, also, the development of skills in communication, practical abilities in the assessment and management of different environmental issues that can appear in the daily life of local community.

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Using the *curriculum for local community development*, we proposed one educational module on the topic *Pollution and environmental protection in the rural area* for the students from the tenth class in high-school level. This module is designate for the students from classes of technology education high schools and its principal aims are related to two domains of competences: identification and monitoring of environmental quality in the rural areas, respectively, management of interpersonal relationships. The curriculum is developed in a framework of partnership between our school and the local community, using the resources of local training (material basis of our high-school, teachers, collaborating with economic operators from the area), but also taking into account the local requirements for training in various skills in order to serve the existing or potential economic activities in the area.

METHODS and EDUCATIONAL STRATEGIES

We designed the teaching project for the educational module *Pollution and environmental protection in the rural area* keeping in our minds the content of learning units and the principal aim to develop specific competences and skills, cut-off the theoretical learning with practical activities. The designing of teaching units and the learning evaluation aims were drawn up in pursuit of established goals, assessment suitability of interactive activities and adaptation to the specific elements of geography, demography and ethnicity, economy social and cultural needs of the local community.

In order to develop the expected skills and abilities of our students, we used interactive methods of teaching and learning correlated to the proposed competences – learning through discovery, solving problems, playing roles, case study and small projects of environmental quality's evaluation, creation of portfolios etc. (Costica. 2008). Professor adapts the scientific language to the previous knowledge of the students, the information being selected on criteria of essentiality by correlating the scientific contents and details to the specific abilities, interest level and learning training of our students. In the same time, the professor must choice the best teaching training methods by individualizing and adapting to the learning peculiarities and abilities of students.

The number of course hours is different from one topic to other and about middle part of activities are practical hours, mostly outside of school in the field, the students working individual or in teams about 5 – 8 students, using specific working sheets or/and standard field observation sheets. The role of professor is not only to transmit information but to supervise the students' activity, directing and correcting them through encouraging their interactive dialogues and participation in the experimental observation of environmental particularities around their daily space.

The on-going and final evaluations regard only the specific competences achieved during this educational module. The main method of assessing the specific skills and abilities developed through this module is the practical test. The evaluation and self-assessment test are designed like individual working or observation sheets, scorecards and self-assessment tests. We used also the evaluation through systematic observation, development of one environmental project on topics related to pollution problems in our villages' area, theme classroom, creation and presentation of portfolios.

RESULTS and DISCUSSIONS

The natural ecosystems and the environment like whole represent dynamic systems that are very sensitive to every change due the strong and complex interactions established between the components, leading to partial or overall change of the whole system. Sometimes, the factors that have an influence with latent character on the components of environment, so not obviously or permanent visibility, are more dangerous; often, their identification is too late to permit the remediation of produced damages. More than this, during the last decades, the humanity understood that the natural resources become scarcely and their amount is lower every day, so we must change our traditional approach to the exploitation of natural resources in order to achieve our development and welfare like community.

Environmental factors like air, water and soil have suffered important qualitative and quantitative changes during the recent decades in our region, like everywhere in the world. The adoption and implementation of measures for the environmental protection were neglected for many years due the economic pressures and interests. In addition, we must mention the lack of concern for the environmental education or of the training for ecological skills and behaviour among the rural communities.

Starting from this situation and using the possibility given through the *curriculum for local community development*, our school decided to include one educational module on the topic *Pollution and environmental protection in the rural area* in the educational offer for the specialisation *technician in ecology and*

environmental quality assessment. We followed to cover two domains of competences: identification and monitoring of environmental quality in the rural areas, respectively, management of interpersonal relationships.

The active participation of our students in the teaching and learning activities of this educational module will permit them to develop the scientific research spirit and abilities, but also their creative skills, to acquire supplementary competences required by the local labour market and, finally, to create new job opportunities for our students.

Between the expected results through the design of educational module on the topic *Pollution and environmental protection in the rural area*, we can mention:

1. facilitates the transition of students from the school learning stage to the working life by adapting the training of our students to the local labour market needs;
2. contributing to the increase of socio-professional insertion and mobility;
3. expanding the occupational horizons and deepen the core competencies of our students with general and specialised techniques competences;
4. assures the increase of flexibility in the educational offer of our high-school;
5. contribute to the correlation of the educational offer to the local community needs;
6. create the opportunities to improve the relationship between the school, local community and local labour market.

The design of contents for this educational module requires a multi-disciplinary approach, needing knowledge of biology, chemistry, physics, geography and geology, social sciences and engineering. Step by step, through the theoretical contents and practical activities, our students can learn that the humanity's development and welfare are possible through the sustainable development and long-term conservation of the surrounding environment. By other hand, we follow to stimulate our students' capacities to establish and develop professional interpersonal relations, respectively, the training of their skills and abilities to manage the human conflicts and the expectations of stakeholders, too.

The scientific component of the education through this course follows like main learning objectives for our students:

- to assess the quality of air, soil and waters in our villages, learning about pollution's impact on organisms' health and ecosystems' functions,
- to identify and elaborate a monitoring scheme for the local pollution sources, but also to develop a control system of environmental qualities,
- to implement mechanism to reduce the pollution impact,
- to improve the quality of environmental parameters in our villages.

We must notice that the scientific contents combine the general presentation with the information about the regional and local situation for each topic. In the same time, for the all topics, we used to cut-off the theoretical learning process with the practical activities. About 50% of classes are rolled outside of classroom, like fieldwork activity in the school's vicinity but also in different points inside the villages and in its vicinity.

In order to cover the achievement of first domain of competences by our students through this educational module, we designed the teaching and learning process starting from the following competences:

- a. introduction in the general problems of environmental pollution, knowledge the impact of pollution phenomenon on the daily life quality and long-term evolution of ecosystems, wildlife and humanity, too (Danet. 2005).
- b. monitoring of pollution phenomenon related to the water's quality (Duca & co. 1999, Danet. 2005, Lazaroiu. 2006) – the contents are related to the identification and classification of the sources of pollution for waters (natural and anthropogenic, continuous and discontinuous, incidental and organised), the main categories of pollutants (physical, chemical, biological, solid, liquid or gaseous, thermal), the dispersion of pollutants (leak into the ground, discharge into the rivers and lakes, transverse streams and turbulence) and assessment of water pollution impact on the organisms and environment.
- c. monitoring of pollution phenomenon related to the air's quality (Ursu. 1981, Danet. 2005, Moldoveanu. 2007, Burtica & co. 2005) – the contents regard the sources of pollution for the air (fixed and mobile, natural and anthropogenic), the main pollutants (looking for their aggregate state, respectively, for their impact on the organisms and abiotic components of ecosystems), the dispersion of pollutants (related to the action of meteorological parameters – winds, humidity and temperature) and management of the air's pollution.
- d. monitoring of pollution phenomenon related to the soil's quality (Burtica & co. 2005, Danet. 2005, Lazaroiu. 2006) – the contents concerns the sources of pollution for soil (indoor and outdoor sources, anthropogenic sources – household waste, industry, agriculture and animal husbandry, radioactivity), categories of pollutants (solids and liquids wastes, pathogens, radioactive substances), the dispersion of pollutants (direct or indirect), assessment of soil pollution impact on the environment and organisms, the management of soil degradation through pollution and erosion phenomenon.

e. elaboration, implementation and control of measures for protection of water, air and soils (Ursu. 1981, Danet. 2005) – the contents are related to the main pathways and methods for the wastewater's treatment (mechanic, chemical and biological, respectively, wastewater treatment plants and small or domestic devices for wastewater treatment), the means and methods for the air purification (physical – dry, moist or combined, respectively, chemical – by washing, reduction, separation, absorption or adsorption), but also, to reduce the air pollution (retention of suspended solids, filters etc.), the prevention of soils degradation (especially through agricultural practices), the ecological restoration for waters and soils, the environmental legislation.

f. analysis of collected data from the field, laboratory tests and writing reports (Danet. 2005) – the students go outside of school taking water and soils samples, using instruments to measure the chemical and physical parameters of waters, air and soil; they record the information in individual observation sheets and apply different laboratory tests in order to assess the quality of this three environmental parameters in their native region.

g. elaboration of one project in order to assess and to manage the quality of waters in the students' village – the students have a work-team project and learn to go through all the steps starting from documentation to the final presentation with a simulated public debate on the this type of projects.

For the second domain of competences, the management of interpersonal relationships, we designed the following main teaching and learning objectives:

1. creating and maintaining professional relationships – the contents and trainings through active listening, cooperation and constructive dialogues, reporting their individual roles to the team's objectives, identification and development of the indicators for social cohesion; we expect to improve the existent capacity of professional development for our students.

2. managing the conflictual situations – accountability, identification of the sources for conflicts, management and mediation ways.

3. managing the expectations of stakeholders – the contents and trainings regards the simulation and assimilation of stakeholders' positions (directly or indirectly involved in the conflict), their roles (managers – partners – colleagues - friends), respectively, their interests; the students will learn to communicate with the stakeholders, anticipating, mediating and satisfying their expectations.

Since the initiation of the proposal of this educational module in our school, we thought that the practical activities are very important in order to develop the skills and abilities of our students like future *technicians in ecology and environmental quality assessment*. For this reason, the mostly part of the practical activities hours are conducted out-side of the classroom like practical field trips following to identify, assess and manage the main pollutants and sources of pollution existing on the territory of our village. The students formed small teams about six to ten persons, working for each topic: pollution of waters, air and soils. We had choice to present our experience for the section of monitoring and managing the pollution phenomenon related to the water in our region.

We established the principal objectives for our practical trips before going out-side of classroom: to identify the main pollutants for the waters and their sources from the territory of our village and its neighbourhoods and to assess the impact of this phenomenon on the environmental of our village (natural ecosystems, cultivated lands, our daily life and long-term welfare of our community). Analysing the existing situation, we tried to develop an environmental project that could permit through it implementation - with the support of the local authorities and economical stakeholders - to improve the quality of the waters from the territory of our village and its neighbourhoods by controlling and limiting the impact of the identified sources of waters' pollution in our area.

During their field-work and by laboratory tests, our students identified the main problems correlated with the phenomenon of waters' pollution in our region using the direct observations, the measurement of different parameters in order to assess the waters' quality, documentation and the interview or collection of testimonies with the principal economical stakeholders, local authorities and people from the local community. Between the identified problems, we can mention like very important:

- direct contamination of hydrographical networks and the local aquifer with chemical components (from pesticides and artificial fertilizers) and organics elements (through the direct discharge of wastewaters from households and livestock farms);
- indirect contamination of waters with inorganic and organic elements through the wrong agricultural and animal husbandry practices, including incorrect chemical treatments, respectively, the inappropriate platforms for the animal manure storage allowing incidental or permanent improper spills of organic materials;
- absence of one common sewer system in our village and the insufficient arrangement of individual septic tanks in the households from the village's territory;
- long-term consequences of the old deforestation practices in the area – despite the fact that we cannot talk about present deforestation activities, the disappearance of some forest surfaces increased the phenomenon of topsoil washing and erosion, generating the risk of landslides, respectively, process of small ponds' silting and increasing of the solid suspensions presence in water.

Beyond the phenomenon of water's pollution in our region, the students could see that the local community has numerous complaints related to the water supply situation on the territory of our village. First of all, the volume of the existing sources of water is deficient one. Secondly, the current system of water supply is not available in the appropriate configuration from the technical and legal conditions in rules (source of water – adduction – treatment for drinking water – storage and distribution to the households). In the same time, the sources of water supply are not centralised surveyed and the quality of water is not corrected to the accepted standards for the drinking waters. In the end, but not ultimately, the quantity and quality of distributed water in the households from the villages territory show significant deficiencies, especially during the summer time, when the level of rainfalls is low to very low.

In order to improve the waters' quality and to manage the phenomenon of waters' pollution, our students proposed some measures that could be the point of starting in order to elaborate and implement one local project with financial support from the European Union's funds and Romanian national budget:

- a. creation of one or more water reservoirs;
- b. arrangement and improvement of the existing water supply system;
- c. development of one common sewer system in the all villages from the local administration Cetusca;
- d. development of one or more plants of waters' treatment, combining modern technologies and local resources;
- e. improvement of the waters' quality control system;
- f. development of one educational campaign designed for the local community and for the economical stakeholders, too, viewing the current agricultural, animal husbandry and industrial activity practices and popularising the friendly practices in these areas of activity.

All the time, the professor played the role of one team coordinator and neutral observer trying helps and encourages his students distinguish between the facts and interests, opinions and feelings. All the exercises followed to develop the abilities of communication and the capacities of analysis of our students, too. We notice that our students appreciated that two of the most important skills achieved through this educational module were learning to work inside one team, respectively, to evaluate themselves their receptivity and abilities necessary for this type of socio-professional activity.

It is very important to mention the partnerships developed by our school with the regional authorities in environmental problems department (Agency of Environmental Protection – Botosani County and Environmental Guard – Botosani County), but also with the Romanian Ornithological Society/SOR Birdlife Romania (the oldest non-governmental environmental organisation in our country) which give us an important technical support for the theoretical component, but also for the practical activities segment of this educational module. Part of the practical activities associated with this educational module was possible through the partnerships of our school with the local economic stakeholders (SC Gerard SRL, SC Valcot SA, SC Special Milk, SC Crasnaleuca SRL).

For the ongoing and final evaluation we used the individual working sheet and elaboration of one environmental project. We designed different types of individual working sheets, correlated with each proposed competence. For example, in the section dedicated to the soil's pollution, the student must identify the main sources of pollution for the soil, the existent pollutants in our village and to assess the impact of the soil's pollution on the natural ecosystems, wildlife and our daily life like individual human beings and community. The best results obtained in the educational process through the model of environmental projects were presented in the regional annual symposium *Biodiversity and Sustainable Development*, organised every year around the celebration of the 5th June - International Environmental Day.

More than the classic evaluation, we applied also different motivation way for our students that were involved in this educational module. For example, we motivated and encouraged their participation through the exploitation of the results for each practical activity by conducting regular classroom and Cetusca Village Hall displays, temporary exhibitions, scientific presentations and articles in volumes of regional or national symposiums, respectively, regional and national contests addressed to the students of high schools, creation and updating of informative panels (using also materials offered by our partners, especially, the Agency of Environmental Protection – Botosani County and Romanian Ornithological Society/Birdlife Romania) etc. As we noticed, these modalities of motivation recorded positive impact not only between our students, but stimulated the interest of local community, too.

To conclude, our experience proved that a school which shapes it development and educational offer to the local requirements and needs is more likely to become a modern and special attractive school. The school is a provider of educational services, so, the students will take an option for those schools that present an adapted educational offer and a well-defined personality, different from other ones.

CONCLUSIONS

In the Romanian educational system, the segment of the *curriculum for local community development* permits to the schools from the rural areas to correlate their educational offer to the needs of local labour market and communities.

An educational module on the topic of *Pollution and environmental protection in the rural area* is very welcomed in the Romanian rural areas in the educational offer for the specialisation *technician in ecology and environmental quality assessment* from the high-school level.

The contents must combine the general presentation with the information about the regional and local situation for each topic.

The theoretical teaching and learning process can be cut-off with the practical activities, permitting the development of practical abilities and skills to the students, including an active involvement to identify and manage of the local environmental issues.

The obtained results can be valued through development of some environmental projects in order to improve the welfare of local communities attracting the local economical stakeholders' involvement by partnerships, but also, by the participation in regional or national scientific meetings or contests, contributing to our students' formation and self-confidence increasing.

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