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PEDAGOGICAL CONDITIONS OF FORMING THE ECOLOGICAL CULTURE OF HIGH SCHOOLERS

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Abstract

This article considers issues of forming key components of the ecological culture of high schoolers in the education process of comprehensive schools in the Republic of Dagestan. Based on the experimental research in Dagestan schools, the writers establish a model of forming ecological culture and pedagogical conditions for its realisation. They prove the need for the textbook on the ecology of the region, caused by the fact that, though laws of functioning are the same for various environmental systems, ecosystems of different regions are specific. It is proved that such academic discipline as «Ecology of Dagestan» solves problems of forming the system of modern ecological scientific knowledge and facilitates experiencing emotional and value-based attitude as well as forming appropriate behaviour in various situations of interacting not only with nature, but benefitting general development as a whole. The obtained average data on levels of formation of components and ecological culture in general in high schoolers as a result of educational activities, among control and experimental groups enable to conclude that the suggested «model of forming ecological culture» and given pedagogical conditions of forming ecological culture encourage more effective changes and innovations, and improve the efficiency of this process as a whole. In the course of experimental research the syllabus of the regional discipline «Ecology of Dagestan» has been developed and tested as well as, for the first time, – the coursebook «Ecology of Dagestan» for students of IX-X grades in Dagestan comprehensive schools, which proves the effectiveness of this model.

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Keywords: Ecology, ecological crisis, ecological culture, components of ecological culture, pedagogical conditions of ecological culture.



1. Introduction

Global (planetary) *ecological crisis* has a special place in the range of modern problems of humankind (caused by the conflict between the needs and possibilities of a man and exhaustibility of natural resources). Ecological crisis - is global, often irreversible change of environment (change of climate, land, ocean, loss of biodiversity and other), happening as a result of uncontrolled pragmatic (consumer-like) attitude of a man toward nature (Gagarin, 2002). However, deepening planetary ecological crisis in the 21st century - does not receive adequate political, economical and technological solutions (ecological policy remains out of focus in terms of state and society interests). Current stage of interaction between nature and society threatens the quality of life and the very existence of humanity. As Morris Strang, secretary-general of UN conference on the environment and sustainable growth, puts it in a metaphoric way, «either the whole world is saved, or the entire population dies».

In this regard, the role of ecological education grows. Under *ecological education* one ought to understand,

firstly, teaching the course of classical ecology as science of interacting natural components, secondly, developing in students the holistic worldview, based on the key principles of ecology as science, and enabling learners to have their own positions in terms of environmental protection, social relations and personal development, and, thirdly, practical activity, relying on the first two assumptions, and involving students in the system of social practices. (Leontovich & Savvichev, 2014, p. 98)

Deepening global ecological crisis, increasing number of environmental issues at the global and regional levels, declining quality of environment in Northern Caucasus, including Dagestan, raise new questions for school education. The leading role in forming ecological culture, and realization of ideas of sustainable growth, belongs to comprehensive schools (Nedyurmagomedov & Bagirova, 2014), where the foundations of general and ecological culture are laid, values and senses of student personality are actively formed, ecological norms and requirements are practically acquired. In modern conditions, one of the most relevant among them seems forming the ecological culture of students in comprehensive schools, and especially among school leavers – high schoolers. Many Russian scientists believe that in high school in particular the mnemonic abilities of schoolers enable to acquire and *reproduce the assigned material with the highest efficiency. Consequently, forming ecological culture, which is the ultimate goal of ecological teaching and learning, and general education as a whole.* (Andreeva, 2000, Glazachev & Kogaj, 1999; Danil'chuk & Serikov, 1996; Zverev, Suravegina, Zahlebnyj, Simonova-Saleeva, & Kucher, 1997; Semchuk, 2002; Damadayeva, Akbieva, Sutaeva, & Isaeva, 2017).

Therefore the importance of forming ecological culture is only rising: firstly, in the conditions of unpredictable free market economy, most responsibility for nature management (ecology of the region – Northern Caucasus) falls on individuals; secondly, establishment of democracy is impossible without realizing the universal right for healthy social and natural environment (Doroshko, 2001; Nesgovorova & Ionina, 2004). *Ecological culture* is part of general culture of a personality and society which represents the activity of people for both passing on the accumulated knowledge, abilities, skills and experience in the

area of interaction between a man and nature, and the results of this activity, expressed and fixed in values, norms, customs and actions.

Thus, the purpose of modern ecological education of high schoolers (i.e. leavers of comprehensive schools) is forming their *ecological culture* in the study process.

2. Problem Statement

Despite substantial measures, aimed at solving the problems of ecological education for students in high school, several aspects of forming ecological culture in high schoolers are still not sufficiently developed either in pedagogical practice or in the theory of ecological school education. In particular, it is necessary to search and establish really effective conditions, enabling the formation and development of ecological culture among high schoolers in comprehensive schools as a result of study process. Having analysed the issue, we have concluded that the age of high schoolers – is the most optimal for the process of forming their ecological culture. The idea of research is that the ecological culture of a high schooler, resulting from the study process, represents personal lifetime accomplishment, based on the development of activity-related, cognitive, emotional and volitional spheres of student personality, and the result of its formation is high level of conscious ecological activity of learners.

3. Research Questions

The current stage of developing ecological education of high schoolers is characterized by: vagueness of objectives and contents of school ecological education at different age levels in general and at the stage of teaching «ecology» in particular; low level of greening the disciplines of sciences and arts; ambiguity of roles assigned to certain component parts of social experience in ecological education; lack of knowledge about didactic reasoning and structuring the study process of ecology (Doroshko, 2001; Nedyurmagomedov & Bagirova, 2014; Nesgovorova & Ionina, 2004).

Taking into account the fact that contents and process of education are interdependent, it ought to be noted that realization mechanisms of this interdependence in the process of teaching ecology are yet to be explored (Bagirova I.A., Nedyurmagomedov G.G., Semchuk N.M., and others.), teachers, when selecting the methods of teaching ecology, organization forms of studies, ways of presenting the study material, rely on – intuition and practical experience (Semchuk, 2002). In the school practice of the RD, the educational potential of the study course «Ecology» is hardly realised, which is caused by a number of reasons:

- the school course «ecology» in high school is not equipped with coursebooks for students;
- the level of theoretical and methodological as well as scientific reasoning behind teaching ecology is inadequate;

Ecological education of high schoolers – is incomplete without the basic discipline, there are no effective methods of teaching «ecology» (including the regional course). This contradiction was partially resolved for the first time in 2014, when the school regional course on ecology was developed – «Ecology of Dagestan (Western Caspian Sea region)», for students of 9th (10th) grade of comprehensive schools (Nedyurmagomedov & Bagirova, 2014).

When developing the course, we face a number of problems: in conventional school courses there are no established requirements to the level of competence of school leavers in «regional ecology», as at present studying this regional course (Western Caspian Sea region) as a special entity is not compulsory, - this is due to the fact that there is no common perception of the level of acquired knowledge about ecological characteristics of a region, fragmented knowledge is presented inconsistently, no syllabus is developed to study ecological features of a region in terms of classical and social ecology, as well as ecology of a man; there are very few learning tools, reflecting the ecological specificity of regional ecosystems, ethno-cultural traditions of interacting with environment, regional environmental issues and etc. Therefore, it is necessary to *search and improve effective conditions* of realizing ecological education of schoolers in the study process.

4. Purpose of the Study

The purpose of research is solving the problems of justifying and verifying the pedagogical conditions for forming ecological culture of high schoolers in the study process, with the help of using our newly developed «model of forming ecological culture» and organizational and pedagogical conditions for its realization.

5. Research Methods

To solve the above mentioned problem and reach the objective, the complex of appropriate methods is used that accounts for the specificity of every working stage, i.e. we apply the following *research methods*: review of scientific literature (philosophy, psychology and pedagogics, methodology and ecology) on the topic under study; examining regulations and program-methodical documents on ecological education, including those that concern students of high school; observation, pedagogical experiment, testing, arranging control works; studying and summarizing pedagogic experience and results of experimental research; methods of statistical analysis of experiment results (χ^2 criterion).

6. Findings

Ecological culture at the end of the XX century became ontological, implying not only that it exists in reality, but that the issue of ecological culture represents the foundation of modern personality and society.

The analysis of pedagogic works (Zahlebnyj, 1992; Pustovit, 2004) enables to highlight the key *components of «ecological culture»* of schoolers, being an integral category, and comprising several interrelated and interdependent components (when taking into account age characteristics at every stage of personal development of a student one of them dominates), these are:

– *cognitive – ecological knowledge* (relevant for establishing rational interaction of an individual and «nature»);

– *axiological* (includes *values-aims*: life of a man and everything around him/her (components of nature and etc.), health, sustainable growth of a man and nature; *values-means* – environmentally friendly ways of living, behaviour; attitude toward nature and a man as interdependent components of environment; *values-qualities* – responsibility for actions and etc.);

– *motivational* (*attitude of* an individual to «nature», integrated into the system of dominating motives for actions (behaviour);

– *activity-related* – presented by specific ways of activity in (ecological) reaching the objectives of interaction with environment, aimed at preservation and sustainable development of nature and society.

Resulting from the experiment on forming ecological culture in high schoolers in the study process, we have determined the criteria of competency in ecological culture components (Table 01).

Table 01. Criteria of competency in ecological culture components

Components of ecological culture of an individual	Criteria of ecological culture of high schoolers
1. Emotional-aesthetic component	positive emotional attitude to learning and communication, ability to appreciate (and evaluate) the beauty of natural phenomena; mental mechanisms (will and emotions) directed at activity of an individual in aesthetic relationship with nature.
2. Value-based and notional component	willingness to learn something new, extraordinary and valuable in nature; well-developed reflection on attitude toward nature; dominating motivation, sense-making motives, owing to which the importance of ecological activity is perceived (a student can answer the question «why?» i.e. define the personal meaning and necessity to realise actions, related with setting goals and objectives for school ecological education)
3. Cognitive component	Knowledge of certain objects and phenomenon of nature, conscious awareness of their interrelations and interdependencies; Knowledge of basics of general and social ecology.
4. Activity-related component	readiness to participate in solving ecological problems (including – local ones); ecological activity; ability to apply ecological knowledge in practical eco-activity (observation, classification, research and etc.); ability to forecast the results of natural phenomenon and ecological activity; system of abilities and skills, necessary to perform practice-oriented ecological activity.

Based on the given above structural components and criteria, we define the *levels of competency in ecological culture* among the students of IXth grade (high, medium, low) in experimental schools, and this enables to establish that high schoolers with high level of competence in ecological culture have substantial knowledge and are able to implement this knowledge in practice in various situations; students with medium level are characterised by having the basics of ecological knowledge and skills and the ability to interpret it freely; low level learners demonstrate insufficient amount of ecological knowledge and low ability in implementation of the knowledge and skills in autonomous ecological activity. The obtained data show that most high schoolers have low level of competency in ecological culture components which proves the necessity for concerted efforts to enhance it. The way to reach the set objective we see in

realization of the complex «model of forming ecological culture» in high schoolers. In «experimental schools» we formed control and experimental groups. In control groups the pedagogical conditions were left unmodified, the regional course of ecology was not studied. In experimental groups the entire complex of suggested organizational and pedagogic conditions were tested. At the first stage of experiment in comprehensive schools (Makhachkala, Kaspiysk, Kizilyurt), we determined two groups of *pedagogic conditions*, enabling to increase considerably the effectiveness of forming ecological culture of high schoolers, which were later specified.

The first group comprises *general pedagogic conditions*:

- methodological (consistent, activity-related, axiological and competency-based approach) and methodical support of the process;
- qualification and retraining of teachers in terms of education issues in the sphere of ecological culture;
- organization and management of the study process when forming the ecological culture of students.

The second group includes *specific pedagogic conditions* (which efficiently increase the level of ecological culture of learners), these are:

- arranging common education space of school via integrating classroom, extracurricular and out-of-class ecological activities;
- introducing into the syllabus of high school (9/10 grade) the «regional ecology» (as part of elective classroom hours in the school «Basic curriculum»);
- implementing effective pedagogic technologies (project-based, games and others), enabling the formation of the basics of ecological culture;
- variety of forms, methods and ways of ecological activity;
- changing ways of learning and cognitive activity (from «reproduction» - via «partial search» - to «creative project work»);
- uniformity of learning and practice-oriented environmental activity, implying correlation between contents, forms and methods of educational work as well as adaptation to various kinds of environmental activity;
- creating conditions (in the study process) of moving from one type of ecological values (environmental values orientation) to another, one by one: «value of consumption» – «value of conservation» – «value of restoration»;
- consistent teaching of sciences and forming ecological knowledge, practical abilities and skills;
- accounting for psychological and age characteristics of students when forming ecological culture and its components.

Research was carried out in a number of schools in the republic, using the adapted variant of «Complex survey of ecological culture of students» (developed by S.S.Kashlev and S.N.Glazachev) (as cited in Glazachev & Kogaj, 1999) and it was anonymous, as well as our own questionnaires.

The control group included students of 9th grade, who never studied the regional course «Ecology of Dagestan» (when arranging the study process of ecological education for high schoolers the school teaching staff rarely applied mostly conventional forms of studies).

The experimental groups also involved students from 9th grade, who studied «Ecology of Dagestan» as a school subject, participated in the research activities related with local environmental issues of the region.

The experiment was carried out in natural conditions of the school study process. The system of forming the basics of ecological culture among schoolers was introduced as part of classes on sciences and the course «Ecology of Dagestan». The main directions were *greening* of sciences (biology, chemistry and other): introduction of ecological material into syllabus topics, study experiment.

In the course of the experimental research the syllabus of the regional discipline «Ecology of Dagestan» was developed and tested and, for the first time, – the coursebook «Ecology of Dagestan (Western Caspian Sea region)», for students of IX-X grades in Dagestan comprehensive schools. We notice the positive trend in changing levels of the qualities under study, which is proven by – the increasing number of students with high and medium levels of competency in ecological culture components (Table 02).

Table 02. General dynamics of forming the levels of ecological culture in high schoolers

	Control Groups		Experimental Groups	
	Before Experiment	After Experiment	Before Experiment	After Experiment
High	11,44 %	13,98 %	13,56 %	31,00 %
Medium	43,22 %	50,42 %	47,35 %	53,62 %
Low	45,34 %	35,59 %	39,09 %	15,37 %

The analysis of general dynamics in the development of competency in ecological culture among high schoolers before and after (formative) experiment clearly demonstrate considerable positive changes in experimental groups (high level grows 2,5 times, while low one decreases almost – 3 times), whereas in control groups – there is only somewhat natural improvement. To confirm the obtained results we have carried out the statistical verification, using standard methods, according to the recommendations of Grabar and Krasnyanskaya (1977). As a method of statistical analysis of the educational experiment results we apply the method χ^2 -squared. Values $\chi^2_{emp} \geq 6,69$ for all components of ecological culture in experimental groups which is bigger than $\chi^2_{crit} = 5,99$, therefore the null-hypothesis (H_0) about similarity is refuted and the alternative hypothesis (H_1) about difference is accepted, in other words changes in groups exist and the veracity of these differences equals to 95 % significance. Consequently, the effects of changes for every separate component (cognitive, emotional-aesthetic, value-based and notional, and activity-related), which means as whole as well (in the study process), are caused by the application of the above mentioned «model...» and pedagogic conditions.

7. Conclusion

The results, obtained in the course and at the end of the experiment, enable to claim that the suggested ways of forming ecological culture in students in the process of studies are effective and facilitate the increasing level of competency in basic components of ecological culture. The outcome of the experiment also demonstrates that after finishing the basic biology education (in ninth grade) it is necessary to study special discipline «Ecology of Dagestan» (or «Basic ecology»); reviews from experts allow recommending the syllabus of the course «Ecology of Dagestan» (for students of 9-10 grades) and a newly developed coursebook «Ecology of Dagestan (Western Caspian Sea region)» for students of 9th grade for widespread dissemination and implementation in practice in comprehensive schools of the region.

Therefore, it is possible to note that the ecological culture of a high schooler represents the holistic system, functioning of which is based on harmonious interaction of all components, and the level of its development nowadays – is one of the key indicators of civilised society.

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