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**OBJECT, SUBJECT AND SOCIO-NATURAL ENVIRONMENT AS THE  
PEDAGOGICAL SYSTEM COMPONENTS OF THE ECOHUMANISTIC  
VALUES FORMATION IN SCHOOL CHEMICAL EDUCATION**

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Object, Subject and Socio-natural Environment as the Pedagogical System Components of the Ecohumanistic Values Formation in School Chemical Education

Relevance of the material stated in article, is caused by need of education of morally increased school students who consciously consider as a basis of social and natural existence of society system of the ecological and humanistic values, capable to bring Ukraine out of crisis and, first of all, ecological which has mainly chemical character. Therefore pedagogical system of formation of ecological and humanistic values of school students in the course of chemical education along with traditional structural components as in particular object and the subject, has to contain in quality of the integral component social and environment. In research the new maintenance of each of the components of this pedagogical system stated above is submitted and connection between them is established.

The main characteristics of the school student – priority and the importance of a private sphere of training are considered; the purpose of own activity and active position in its achievement; inclusion of own experience in educational process, its coordination with public experience; recognition of value of the general experience, interaction value; reflexive introspection; emotional intelligence. The characteristic is given to the teacher of chemistry of the following directions: functions and components of pedagogical activity; requirements to the teacher; professional readiness to formation of ecological and humanistic values of school students. On the principles of the general theory of systems inclusion social and environment as the integral component of pedagogical system of formation of ecological and humanistic values in the course of school chemical education is proved. Functional characteristics of the component “social and environment” which it stores as external system are provided, and also provides as a subsystem of the pedagogical system developed by us.

*Key words:* object, subject, social and environment, pedagogical system, formation of ecological and humanistic values, school chemical education.

The pupils’ ecohumanistic values formation in the process of the school chemical education will be effective if this process is organized as a pedagogical

system, where: the *goal* is accented on the ecoaxiological potential of Chemistry implementation, in particular in the cognitive, operative and the emotional-moral spheres; the *content* is oriented on the axiologization of the school chemical education, its general cultural context, schoolchildren's key capacities (including also ecochemical ones) obtaining and provides the design of the individual educational way of their ascent of the personal position understanding in the process of the creative, active and value-oriented ecochemical knowledge, skills and attitudes obtaining; The *pedagogical technologies* are based on the integration of the axiological and system approaches, taking under consideration schoolchildren's psychological peculiarities, their values, ideals, convictions emphasizing creative, active and value-meaningful knowledge and skills obtaining.

Schoolchildren (*the objects*) in this pedagogical system are the active subjects of the educational process – they have a goal of their own actions and an active position in reaching that. The system includes the own experience into the educational process, agrees it with the social experience. It recognizes the common experience values, the values of the cooperation in the educational process and in the socionatural environment. This system realizes the reflexive self-analysis for the moral spiritual development and self-development. The teachers of Chemistry are professionally ready for the ecohumanistic values formation in the pupils and act as the leading *subjects* in the mentioned values formation in the process of the school chemical education. Apart from the traditional components of a pedagogical system (goal, content, technologies, object, subject) the pedagogical system of the ecohumanistic values formation in the process of the school chemical education includes also new, distinguished by us component – socionatural environment – that makes our pedagogical system open and dynamic. The necessity of this very component inclusion is defined with the fact that the objective basis of the mentioned pedagogical system formation is a problem situation (sociospiritual and ecological crises), meaning such an unsatisfactory state of the outer (socionatural) environment elements, that the environment is incapable of normalizing this state with the own means (the totality of the outer environment systems) at this stage.

The analysis of the actual investigations, the one by Sh. Amonashvili, shows that the effectiveness of any study, and of the ecological as well, directly depends on the relations between pedagogues and pupils. The traditional methods of upbringing existing in the modern school nowadays are based on the position of domination teachers over the pupils. Pupils act mostly as the objects, the teacher's upbringing influence is directed at them. Cooperation is possible only in case of the subject-object interaction, when the pupils have the equal positions. Teacher acts as the organizer of the pupils' educational needs and their activity, of the learning work, defines the methods and the ways of its implementation. In this case pupils become the subject of the activities and the equal partners. They gradually turn from the passive objects of the outside influence which the educative process is directed at into the active subjects of the pedagogical interaction.

The goal of this article is the substantive description of the object, subject and the socionatural environment as the pedagogical system of the ecohumanistic values formation in the process of the school chemical education in the context of methodology-theoretical aspect of the investigating problem of the defined values.

The object of the pedagogical system created by us is pupils (schoolchildren), in whose axiosphere the ecohumanistic values formation takes place. The substantive component of the given pedagogical system construction has already allowed to distinguish knowledge, skills, personal features, ecohumanistic values and the value orientations that they must obtain while studying Chemistry. However it's necessary to mention that the ecohumanistic values formation depends not only on the substantive content of the subject, on the pedagogical technologies in the directed teacher's activities store, but on a pupil himself, on his intellectual, emotional, volitional development, his inclinations, interests, motives, purposes, attitude towards study. On the assumption of this, we will consider a schoolchild's basic characteristics, which, to our mind, are important for the mentioned values formation.

1. Priority of the individually meaningful sphere of study. It means that such a component as the pupils' valuable attitude, their activity motives becomes the priority in the Chemistry content choice and implementation. In order to reach that a

schoolchild, first of all, must become an object of self-observation in the process of the knowledge mastering – to analyze, to realize, to evaluate his own state, to plan, foresee and evaluate the results of his own activity, to take independent decisions, to create humane relations with the others and with nature. Due to this the pupil's subjective experience shows up – life experience, that he gets in the certain conditions of the socionatural environment, in the process of the values perception and understanding of the world of nature, people, substances and the things. The schoolchild's subjective experience agrees in the learning process with the context of education, that creates sociocultural patterns as concepts, laws, rules, the ways of actions, behavior that are necessary for all. That is why working out the context of the school chemical education, as it was mentioned above, it's very important to take under consideration the pupil's particular features as the basic factors of the subjective experience formation [2, p. 9]. Apart from that, the metaknowledge(objective knowledge) (the knowledge about knowledge, particularly about the vitally important one) insertion into the content of education will increase its development function. Under condition of its implementation the knowledge and skills will turn from the goal of education into a means of being a subject of the self-learning ability development in a pupil, and this ability will transform into the means of the pupils' cognitive, creative abilities and their motive-senses actualization (self-realization) [3, p. 18].

As the personal values sense of education in many aspects depends on the motive that a pupil is led with, the sense creative motives of his education that influence on the world perception and attitudes to life appear to be more effective and more meaningful that the motives-stimuli, that incite to the certain actions. To organize a schoolchild's motivated display and development of the personal educational senses it's necessary to single out such key parameters of study: the fundamental objects of the surrounding world; the experience of the schoolchildren's activities concerning these objects; the fundamental achievements of the humanity concerning these objects; the experience of the schoolchild's activities concerning the achievements of the humanity. The process of the pupil's search and retrieving

educational valuable meanings concerning the surrounding world objects as well and the achievements of the humanity in the Chemistry branch implies the following stages: 1) a pupil's personal creative work concerning the fundamental objects of the surrounding world (a pupil's educational production as the personal sense of his education); 2) a pupil's self-realizing of the personal experience, knowledge, skills and emotional valuable attitude, that show up in the process of the fundamental objects and general cultural knowledge about them (reflexively received results of the cognition and the creative work); 3) the pupil's attitude and his corresponding activity concerning the fundamental achievements of the humanity connected with the researching objects (the pupil's attitude towards the general cultural knowledge and social experience) [4, p. 186]. It allows a schoolchild to overcome the estrangement from the educational content, to single out the personal valuable-meaningful basis. The study motivation appears also in the goals that a pupil chases in the learning activity.

2. The goal of the personal activity and the active position in reaching it. The pupil's turning into the subject of the educational activity happens only after the goal of his personal activity appearance and his active position in the certain reach of its goals-tasks (cognitive, researching, turning, designing, ecoethic, nature protecting etc.), that must become the teacher's main task, because this goal cannot appear in a pupil automatically: it must be formulated and realized by a pupil with the teacher's help. Set and realized goals are the guides for the further schoolchild's activity. Due to this he will implement the process of the goals creation as the formation of the subjective basis necessary for the activity: its motives, goals and tasks [15, p. 11]. We believe that the social importance of the educational product understanding and assuredness in its value for the others have to become leading in the pupil's motivation and the goals of his own educational activity setting.

3. The personal experience inclusion into the educational process, its coordination with the social experience, because the pupil's axiosphere development in the process of study goes on through the permanent enrichment, transformation, growth and the qualitative changes of the subjective experience and connected with it

personal meaning from the utilitarian pragmatic (life) to the valuable philosophic one. As a result, the one who studies in such conditions transforms the old concepts and generates the new knowledge and values going beyond the subjective experience limits, moving it into the sociomeaningful content, thus achieving its personal perception.

4. Recognition of the common experience and the interaction value in the educational process and in the socionatural environment through the realization that any idea born during communication is dialectic by its descent. Apart from that, the wider, the more diverse the pupil's contacts are, the more he individualizes, the more conditions are for his self-realization and consciousness formation, that is the individual development and values acceptance are provided with the socialization in the process of the schoolchildren's personal contacts, dialogs with a teacher, the world of adults and nature [6, p. 13 – 14].

5. Reflexive self-analysis, because the pupil's humanistic values formation, according to I. Bekh, is indissolubly connected with the ascent of his personality to the spiritual values. Due to such self-analysis a schoolchild: actualizes attention that sets the direction and the concentration of the psychic processes, its productivity; comprehends his I with the aim of making sure if any changes in the own personal structure have happened or not; unites the formed values for the complete I-personality image creation, morally-spiritual development and self-development [7, p. 37 – 38].

6. Emotional intelligence. American psychologists P. Selowey and D. Mayer consider emotional intelligence as a complicated psychological construct, which includes three types of skills: to identify and express emotions, to control own emotions, to use the information about them for the own thinking and behavior management. At the same time another American psychologist Ruven Bar-On offered to define this type of intelligence as all the non-cognitive abilities, knowledge and competencies that make it possible for a human to deal with the different life situation successfully. Scientists singled out five spheres, in each of them the most specific skills leading to the success are defined: own personality cognition

(awareness of own emotions, self-confidence, self-respect, self-realization, independence); interpersonal communication skills (interpersonal relations, social responsibility, empathy); the adaptation ability (problems solution, reality evaluation, adaptability); stress situations management (stress resistance, impulsiveness, control); prevailing mood (happiness, optimism) [8, p. 4].

The pedagogical system subject in the context of our investigation is a Chemistry teacher, who's occupied with the pupils' ecohumanistic values formation. Characterizing the subject of the pedagogical system (a teacher) we will base first on the functional content of the pedagogical activity (V. Ginetsynsky, V. Grinjov, N. Kuzmin, S. Musatov, V. Slastjonin, A. Scherbakov etc.) and will support proposed by V. Semichenko productive approach, based on three hierarchic levels of such activity functions singling out: 1) *terminal functions or functions-units* (educational, upbringing, developing, socializing, life-support); 2) *instrumental* (or *tactic*) functions or *functions-tools* (informing, illustrating, sense-creating, organizing, diagnostic, differentiating, stimulating, prognostic, cultural, psychotherapeutic, recreational); 3) *functions-methods* (measuring and evaluating, methodic, leading, system-creating, hierarchization and structuralizing, correcting, stating, form-creating) [9]. The given list is close to us with its content and to some extent highlights the functions of a Chemistry teacher. And the components of his humanistic-oriented activity that apply to the teacher's own personal and professional features directly, must be axiological, ethic, gnostic, governing, content, communicative, perceptual, organizing, creative-constructive, designing, etc., which we agree with L. Khorunzha in [10].

Secondly, the pedagogical activity functions are closely connected with the general requirements to the teachers, which in the professional development and self-development processes are the following: having a complete humanistic worldview, humanistic knowledge about human nature, deep personality ecology; psychological competence and culture, the ability and the need for the own features, personal actions and the schoolchildren's cognitive study activity reflection (including the one based on the moral and ecoethic approaches), in the professional personal self-

development; high creative potential; the ability to solve the vital and professional contradictions in a humanistic way, not harming pupil's actions logics; the ability to make and to put into practice the individual personal professional programs [11, p. 45].

On the assumption of our investigation subject matter and taking under consideration our requirements to a Chemistry teacher, who forms the pupil's ecohumanistic values, we consider it to be very important to add the following ones: the basis of the pedagogical axiology knowledge, of the pedagogical methodology of the system approach, of the philosophy of education; social activeness and the active ecological position.

Thirdly, the more detailed content consideration of the requirements to a Chemistry teacher must go in the terms "professional fitness" and "professional readiness" that have the special shades of sense and are used in the different contexts. *Professional fitness* is a totality of the psychic, psychophysiological and physical peculiarities of a person necessary for reaching success in the chosen profession, while *professional readiness* for the pedagogic activity except for professional fitness includes also scientific-theoretical and practical pedagogue training [11, p. 38]. So, let's characterize the components of Chemistry teacher's professional readiness for the ecohumanistic values formation in schoolchildren.

1. *Scientific and theoretical readiness* – is the professional knowledge of subject (knowledge of the classical disciplines of chemical cycle, as well as Biochemistry, Ecotechnology, Chemical ecology, Ecological chemistry and other similar topics) Ecology, Pedagogy, Philosophy, Teaching axiology, Psychology, Human physiology and knowledge of the methodological problems of Chemistry and, also, their world outlook values history of chemistry not as a sum of facts, but as a dramatic evolution of the problems and their solutions.

2. *Practical readiness* - the ability of chemistry teacher to carry out formation of ecological - humanistic values of schoolchildren. We identified such abilities as: *chemical* (methodological, technological and technical that provide axiology of chemical education) [12] , *ecological* (skill system cognition of nature



and the ability of elementary culture of nature use) [13], *pedagogical* (constructive, communication, organization, didactic, perceptive, suggestive, research, educational, applicative knowledge in pedagogical and psycho technics) [14, p. 280 – 283]; *psychological* (skills, to organize reflection of learning activities for students, understanding of the life meaning, place in the world, their uniqueness and value).

3. *Psychophysiological readiness* - professionally important individual quality of chemistry teacher, which specify the effectiveness of axiological targeted pedagogical activity and the ability to carry out the formation of ecological-humanistic values of schoolchildren. Structure of this component of readiness, in our view, should be: *humanistic orientation of the person* (interests, values, ideals, love for children); *psychological and pedagogical qualities*(sense of national dignity, honesty, conscientiousness, fairness, objectivity; excerpt restraint, patience, tactfulness; organizational skills, ability to work with pupils; comprehensive development, adherence to principles and exactingness, optimism, love of life; responsiveness, and humane attitude to humans and nature, the creative mindset) [Ibid, p. 277 – 280]; *quality of “ecological personality”* – a holistic biosphere worldview, the adoption of the ecological imperative, the ability to effective cooperation in solving eco-ethical problems (communicative); the ability to see ecological problems (observation), the ability to find innovative solutions during considering chemo-ecological problems (flexibility and originality of thought), the ability to predict long-term effects converting natural action (predictability) conscious responsibility for activities in nature and others.

We are convinced that such a willingness to provide high psychophysiological pedagogical culture teachers – professional culture, covering his moral qualities, pedagogical tact, pedagogical communication, pedagogical mastery, culture of appearance and language culture. The main structural components of pedagogical culture are pedagogical value, creative ways of pedagogical activity, the experience of making samples of pedagogical practice from the standpoint of humanism [11, p. 39].

4. *Psychological readiness* – suggests Chemistry teacher to form focus on chemo-ecological safety activities over the humanistic oriented educational work with students on their formation ecological and human values, and the presence of emotional and evaluative relationship to teaching and safe chemo-ecological activity. These relationships are associated with such an important characteristic of the teacher as a social activity and active environmental stance and are deterministic social orientation of its educational activities.

So, we have already described in the context of theoretical and methodological aspect of the research problem pedagogical system components forming ecological and humanistic values of chemical education in the school, which are considered traditional components of pedagogical systems, – objectives, content, teaching technologies and particularly in this work – the object and the subject. There left to make the characteristic of one new component that selected by us – ***social and natural environment***, without such, in our opinion, created educational system would not get its structural and functional completeness – integrity. Under the social and natural environment, we will understand the social and natural environment of human, which is a complex of social, physical, chemical and biological factors, immediately or remotely, directly or indirectly make an affect to the vital activity and full development of personality, and also on other living organisms.

In general system theory is an extremely important position on the relationship of systems and environments, their isolation, mutual influence, the role of environment in the life of the system. In our case the environment (social and natural) served as an essential component of the established educational system, fundamentally changes the understanding of the nature environment as a category of systems theory and their relationship with the system and its components. As noted by V. Afanasyev: “Due to the fact that the external environment has great value for the operation of the complete system should be considered in the knowledge dependence of the properties of the system from both internal factors - composition and structure and the processes occurring in the surrounding environment. The

environmental conditions – is a necessary background on which and with the participation of the whole operation is being set” [15, p. 159].

In the created educational system environmental component retains a number of characteristics inherent in the environment as an external system: environment constantly make an effect on the system, which is associated with him multifarious metabolic processes; influence of the environment on the system is ambiguous (active or passive, favorable or unfavorable); system effect on environment through its functions, which are defined by the purpose of its development (existence); the system uses the environment as source of existence and utilizer of products of its vital activity, in the process of interaction of the system with the environment outside of the system change [16, p. 65].

Adaptation (from lat. *Adaptare* – adapt) – the problem of survival in the social systems environment, which arises in the context of global civilizational problems and existence of humanity in the context of ecological disaster. We classified our educational system to social, because our research interest represents the understanding of this phenomenon as the way in which social systems "supervise" or responsible for the existence of his environment. As noted by T. Parsons, adaptation – one of the most important functional requirements that are most important to society's functioning and survival [17, p. 152]. In addition to the above, the problem of analyzing the ecological and chemical formation of pupils, we concluded that to solve complex of problems of psycho-pedagogical formation ecocentric outlook of the person based on the environmental paradigm it is necessary to gradual formation in the minds of students some mental facilities [18, p. 54], recognize the undoubted common way of development of human civilization and nature (to understand the integrity and interdependence of social and natural environment and the fact that they can only be developed in the process of co-evolution). This allocated by us psychological setting correlates with the system requirements for the storage system and a balance environment. When system breach and comes into conflict with the environment. Destruction of its assimilation (dissolution), submission of the system environment, qualitative change in the properties of the environment or its inclusion

in the system can be a solution to this problem. It is the last way to resolve the contradictions of the system interaction and environment and was put into the selection of social and natural environment as part of the educational system, that was created by us. At the same time we also took into account the conditions of convergence (rapprochement of systems): the general environment existence of the two systems, the openness of both systems commonality and consistency of systems development goals; mutual positive effect systems [16, p. 66, 17, p. 155].

Functioning of educational system forming ecological and humanistic values of schoolchildren in the study of chemistry involves the following major activities during the interaction between the individual (schoolchild) with the social and natural environment: cognitive, transformative, evaluation, communication and conservation. At the same time thanks to the inclusion of social and natural environment as an equal part of the established educational system, this system provides an effective solution to the following problems: a holistic worldview based on modern ecological worldview; realization of the oneness of all life, as well as animate and inanimate nature; self-understanding and attitude towards the world as part of himself, understanding the nature and diversity of values of depletion life, a systematic approach to the study of living systems at various level of organization, their interaction with the environment, replacing the anthropocentric approach to the study of natural processes and phenomena on the biocentric and polycentric, understanding the causes of conflict (the appearance of chemo-ecological problems) in the “nature – society” as a mismatch of natural and social laws of the formation of environmental responsibility for the environment, their health and the health of others, the development of an idea of the dialogue of cultures as uncontested philosophy of the contemporary sociocultural and natural environment.

Besides, the continuous analysis of the relationship “chemistry – socio natural environment” will allow students to consider any chemical-environmental problem in a wide range of social priorities with universal humanistic principles, analyze the interaction of society and nature in the global and regional scales, provide immediate and long-term consequences of human impact on the environment. So substantial

characteristic of the above components pedagogical system forming eco-humanist values in the process of school education in the context of chemical theoretical and methodological aspects of the research problem to the following conclusions:

1. The main characteristics of the student – the object of pedagogical system that is important for the formation of his ecological and humanistic values. This priority individually significant areas of study, the purpose of its own activities and its active position in reaching; belief in themselves, their success, their natural abilities, which together with the purpose and installed in accordance determine the direction of self willpower personality, including his own experience in the educational process, its coordination with the social experience, recognizing the value of shared experiences, values, interaction; reflective introspection, emotional intelligence.

2. Subject of pedagogical system - chemistry teacher – was characterized in the following areas: function (function-purpose function facilities, function techniques) and the components of pedagogical activity (axiological, ethical, gnostic, management, informative, communicative, perceptual, organizational, creative constructive projective); requirements for teacher (general requirements we added chemical and environmental expertise, knowledge bases of pedagogical axiology, teaching methodology of systematic approach, philosophy of education, social activity and active environmental position); professional commitment to the formation of ecological and humanistic values of students (in its components – scientific, theoretical, practical, psycho-physiological, psychological readiness).

3. During school chemistry education, based on the general theory of systems, the inclusion of social and natural environment justified as an integral part of the pedagogical system in formation of ecological and humanistic values. Functional characteristics of the environmental components, which it holds as the external system are given and also supply with a subsystem we developed educational system.

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Роман С. В.

Об'єкт, суб'єкт і соціоприродне середовище як компоненти педагогічної системи формування еколого-гуманістичних цінностей у процесі шкільної хімічної освіти.

Актуальність матеріалу, викладеного у статті, обумовлена необхідністю виховання морально зрослих школярів, що свідомо вважають основою соціоприродного існування суспільства систему еколого-гуманістичних цінностей, здатних вивести Україну з кризи і, перш за все, екологічної, яка має переважно хімічний характер. Отже, педагогічна система формування еколого-гуманістичних цінностей школярів у процесі хімічної освіти наряду з традиційними структурними компонентами, як зокрема об'єкт і суб'єкт,

повинна містити в якості невід'ємної складової й соціоприродне середовище. У дослідженні представлено новий зміст кожного з указаних вище компонентів цієї педагогічної системи й встановлено зв'язки між ними.

*Ключові слова:* об'єкт, суб'єкт, соціоприродне середовище, педагогічна система, формування еколого-гуманістичних цінностей, шкільна хімічна освіта.

Роман С. В.

Объект, субъект и социоприродная среда как компоненты педагогической системы формирования эколого-гуманистических ценностей в процессе школьного химического образования.

Актуальность материала, изложенного в статье, обусловлена необходимостью воспитания морально возросших школьников, которые сознательно считают основой социоприродного существования общества систему эколого-гуманистических ценностей, способных вывести Украину из кризиса и, прежде всего, экологического, который имеет преимущественно химический характер. Поэтому педагогическая система формирования эколого-гуманистических ценностей школьников в процессе химического образования наряду с традиционными структурными компонентами, как в частности объект и субъект, должна содержать в качестве неотъемлемой составляющей и социоприродную среду. В исследовании представлено новое содержание каждого из указанных выше компонентов данной педагогической системы и установлены связи между ними.

*Ключевые слова:* объект, субъект, социоприродная среда, педагогическая система, формирование эколого-гуманистических ценностей, школьное химическое образование.

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