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**THE DIRECTIONS OF INTEGRATION OF AXIOLOGICAL AND SYSTEM  
APPROACHES IN VOCATIONAL TRAINING OF FUTURE TEACHERS  
OF CHEMISTRY TO FORMATION OF ECOLOGICAL AND HUMANISTIC  
VALUES AT SCHOOL STUDENTS**

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The Directions of Integration of Axiological and System Approaches in Vocational Training of Future Teachers of Chemistry to Formation of Ecological and Humanistic Values at School Students

In article the author presented theoretical and methodological justification of nine perspective directions of integration of axiological and systemic approaches in vocational training of future teachers of chemistry to formation of ecological and humanistic values at school students. Within these directions such integration provides: consideration of values of the personality from a position of their unity, integrity, that is system of values; the account in system of values of the identity of difficult hierarchical structure; harmonization of binary valuable oppositions in system of values; consideration of ecological and humanistic values as systems concerning its integrated components (humanistic and ecological values) and at the same time as subsystems in system of individual values of the personality; transformation of ecological and chemical concepts of value, significant for an inner world of the personality; consideration of the world as the complete integrated system in which the person appears as making pictures of the world and bears responsibility for the destiny, life of an environment and for the future of the world; and also is based on the principles of logical and structural creation of a pedagogical axiology; represents the stimulating innovative educational value-technology; provides further inclusion of the created ecological and humanistic values in structure of chemical and axiological consciousness of the personality and her chemical and ecological competence.

*Key words:* integration of axiological and systemic approaches, professional training of the future teachers of chemistry, formation of ecological and humanistic values at school students.

Axiological (valuable) approach as theoretical model in which one of ways of modernization of the higher pedagogical education according to requirements of modern society is displayed, can be successfully realized only in integration with the leading ideas of other modern methodological approaches, in particular system approach. It can be explained to that different elements of valuable orientations present, on the one hand, "stages of understanding by the identity of system of values which exists out of it, and their transformation under the influence of a number of factors to system of internal personal social orientation, and on the other hand – display structural hierarchical character of system of values which surrounds the personality" (M. Kuzminov) [1, p. 109]. Therefore integration of axiological and system approaches actively takes root into modern student teaching. In particular, V. Klepikov uses axiological integration as educational technology of ethical education of school students [2], A. Volkov, N. Dvulichanskaya, S. Matakova and G. Fadeev consider unity of system and axiological approaches as a new paradigm of competence-based training of chemistry in system of continuous education "school – college – higher education institution" [3]. However to formation of ecological and humanistic values at school students integration of the specified approaches in the context of a humanization of chemical education wasn't applied to vocational training of future teachers of chemistry, and in this regard our research is important and actual, and development of the perspective directions of such integration – the purpose of this article.

Realization of integration of axiological and system approaches in vocational training of future teachers of chemistry to formation of ecological and humanistic values at school students provides, first of all, clarification of the concept "integration" of education, and also its importance and influences on pedagogical process that reflects aspiration of development of the modern young personality who owns system thinking, is capable to the conscious analysis of the activity, can independently work in the conditions of uncertainty, and also acquire new knowledge and abilities on the basis of the created valuable orientations.

So, integration (from Latin *integratio* – "restoration", "completion" and *integer* – "whole") – the party of development connected with association of earlier diverse parts and elements. Processes of integration can take place as within already existing systems (in this case they conduct to increase of level of their integrity and organization), and at emergence of new system from earlier untied elements [4, p. 215]. It is illustrated visually by the main stages of integration processes: objective prerequisites → separate components → association mechanism → installation of inter-component communications → emergence of a conglomerate → synthesis of a new growth [5]. Thus it should be noted that integration it isn't simple a reconstruction of integrity and a partitioning of informative objects, not only strengthening of communications, it is change of initial elements. If such change is absent, there is no strengthening of communications also, there is a mechanical association. Integration process means a new growth of integrity which owns system qualities general scientific, between and in scientific interaction, the corresponding mechanisms of interrelation, and also changes in elements, functions of object of studying that is predetermined by feedback of system means and qualities which are formed again. Integration radically changes the contents and structure of scientific knowledge, intellectual and conceptual opportunities of separate sciences. This important means of achievement of unity of knowledge in semantic, structural, logical and gnoseological, system and axiological, scientific and organizational, the general methodological, pedagogical aspects [6, p. 76].

In the context of vocational training of future teachers of chemistry to formation of ecological and humanistic values at school students we will understand the highest form of purposeful expression of unity of the purposes, the principles and the content of the educational process organized on the principles of a pedagogical axiology and system methodology of which functioning formation at the identity of qualitatively new complete system – systems of ecological and humanistic values – deduction of set of the specified values in their complete unity and unique expressiveness is result as integration of axiological and system approaches, thus values are organically integrated into consciousness of the young man and become a

basis of its subject relation to the natural world, society, themselves. In the light of the general modernization of an education system such integration demands an organic combination national and universal began that is displayed in nine *perspective directions of integration of axiological and system approaches offered by us in vocational training of future teachers of chemistry to formation of ecological and humanistic values at school students.*

***1. Integration of axiological and system approaches in vocational training of future teachers of chemistry to formation of ecological and humanistic values at school students provides consideration of values of the personality from a position of their unity, interrelation of the components (elements) making them, as complete education – system of values.*** Such principles became the theoretical and methodological bases for definition of this direction: 1) system approach to process of formation of system of values of the personality provides idea of her integrity; 2) the complete analysis of values of the personality provides allocation and justification of the most general, in a sense formal elements which allow to describe their different aspects (in our research by aspects we will consider independent parts of complete structure, that is parts or blocks of uniform structure of values which display motivational and significant, procedural and productive, communicative and approximate their parties); 3) each aspect of system of values is treated as a component of complete, indivisible system; a necessary stage is studying of its different aspects and their components in synthesis; 4) degree of coherence of its different elements can be an indicator of level of integrity of system of values; 5) integrity as the characteristic of system provides the analysis of hierarchical structure of its components.

Thus, when forming system of values of the personality it is necessary to proceed, in our opinion, from need of studying of their axiological structure both from a hierarchical structure of components, and from correlation structure, that is communications and the relations in aspects, as well as between these aspects. So, values of the personality is a complete phenomenon which is characterized by a system sign and has equal quantity of the functioning elements compatible with each

other and the specific axiological relations between them which find functional aspect of personal value in the course of activity. The main characteristic features of system of values of the personality are: integrity, difficult multi-component degree of structure (complexity of the hierarchical organization), openness, incompleteness, dynamism (ability to change own states, keeping qualitative definiteness), self-development (on the basis of feedback), external and internal determinacy, nonlinearity, evolution [7, p. 20]. Yu. Shaygorodsky considers hierarchical and correlation structure of complete system of valuable orientations of the personality in unity of the following aspects (and their components) – motivational and valuable, communicative and approximate, procedural and productive [8, p. 96 – 102].

The system of values of the personality represents an integrated internal and external indicator of essence, integrity and a maturity of the personality in all variety, width and hierarchy of valuable interrelations and interrelations with other personal resources. The steady system of the interconnected values has significant communications with peripheral values. Correlations of the leading and peripheral values allow to judge the width of valuable system. Identification of significant positive and negative communications will allow to influence productively the leading values presented in consciousness, thereby static-zing peripheral values which correlate with leaders. Definition of significant communications between the leading group of values, their stability, width and a variety will allow to influence personal and professional formation and development of the personality and will give the chance to predict some behavior models of the person not only in the concrete environment (society, the nature) or educational and professional activity, but also in different life situations. Identification of the specified interrelations gives the chance in the course of educational and vocational training to influence one end of the interconnected chain, thereby having impact on another and, in general, on values of the personality. In this regard formation, reorganization and development of a certain system of valuable communications will help the personality most to provide the stability and integrity, and also to keep the lives forming the quality system in different situations [9, p. 9].

Thus, formation of system of values has to be perceived as the integrity realized during internal dialogue during which there is a bifurcation on subjects of the lowest order in the course of connection of spiritual positions. It should be noted that internal dialogue is a basis of understanding of the maintenance of life, and its understanding is, first of all, working off of the main maintenance of a conceptual kernel of consciousness which is understanding and experience of sense of own life that, in essence, is the key value of the personality [10, p. 17].

***2. Integration of axiological and system approaches in vocational training of future teachers of chemistry to formation of ecological and humanistic values at school students provides the account in system of valuable orientations (values) of the identity of difficult hierarchical structure which components allow values to influence development of ideals.*** The most successful attempt to construct system of valuable orientations (watch the table), which is taken by us as a basis of definition of this direction, belongs to N. Astashova [11].

#### **Valuable orientations as multilevel system**

Valuable orientations	Sociable	Ideal	Perfect image, that makes the prime target of aspirations
		Principle	The internal belief defining standards of behavior
	Individual	Purpose	Result anticipation
		Relation	Interconnection of sociable and individual values
		Value	Definition of sense thanks to which there is an estimation

Besides, system approach in an axiology defines also hierarchy of values depending on a mode of the subject of the valuable relation (M. Kagan, L. Stolovich, V. Lektorsky). Thus the specified subject can be the specific individual; group, or collective, subject (small directly contact group or not-contact community of the nation, people, brothers in faith, social class); human society in general, mankind as subject of historical development. Therefore also values can be individual, collectively group and universal [12].

Modern calls of a civilization determine consideration of ecological and humanistic values at the same time as an axiological subsystem of three systems of values – universal, national, individual. If universal values serve preservation and development of the human race, national provide a reconstruction and development of the concrete epos and thanks to it his certain representatives. Universal is meta-system rather national, and it, in turn, is such rather personal. Two last only so far as have the axiological contents as don't contradict, and promote interests of all human society. Structural components of national and personal valuable systems correspond to that are allocated in universal hierarchy. Thus the universal is approved through individual, and individual is presented, axiological and is legally fixed in the concept "fundamental human rights" [13, p. 18].

Thus, the only integration field of universal values is a peculiar axiosphere in which are included both separate values, and space of their functioning, and all values essentially keep the national and cultural signs, aren't dissolved in other values, but in the course of their interactions and enrichment temporary sites of correlation, interface, crossing appear meanings. Thus occurs not only identification of universal values, but also enrichment of national, ethical, personal and other values which participate in dialogue.

The hierarchy of values considered above depending on a mode of the subject of the valuable relation correlates with the system of values offered by I. Meshkov. The author divides system of values into two valuable subsystems the interrelation between which can be tracked both from the moral and ethical point of view, and from the point of view of social needs of people: the static (steady) subsystem – contains values which are invariable throughout many centuries, are universal (humanistic, religious) and national values; the dynamic (unstable) subsystem – includes values which change depending on requirements of society, are the state, social (sociable) and personal values [14, p. 138].

Than more accurately the system of universal, national values which are realized by most of people is formulated and objectively proved, the personal orientation of educational system is defined more accurately, the more there will be a

plane on which the personal system of values of the person is based. Thus the distance between the plane of universal values and the plane of personal values will decrease, and the system of values which were seized by the person, will be more saturated, full, and, therefore, and spirituality level – higher [15, p. 33 – 34]. Told it can be illustrated with the following scheme: updating of individual moral values and meanings → familiarizing with universal values and identification of universal meanings → replenishment and enrichment of personal moral values due to assimilation of the universal.

***3. Integration of axiological and system approaches in vocational training of future teachers of chemistry to formation of ecological and humanistic values at school students provides harmonization of binary valuable oppositions in system of values.*** The orientation of integration of the specified approaches on overcoming of contradictions between global and local problems, on education of the citizen of the world without loss of own "roots" became the theoretical and methodological basis for definition of this direction that in turn provides formation at it both universal, and national values.

So, system of values – ideal purposeful and independently organized system. At the same time on the relation one to other value can be in binary opposition (for example, "society – identity", "activity – knowledge", "development – informing", "autonomy – identification", "national – universal", etc.) . Transformation of binary valuable oppositions in system of values possibly at the expense of the following options (mechanisms) of harmonization: mechanism of mutual addition, rather equal interaction and mutual transition of one to another; mechanism of productive proponent transformation; mediocre mechanism; the mechanism of productive and creative integration [16, p. 15 – 16]. In many cases the choice of the mechanism of realization of harmonization conducts or to productive synthesis of values, their creative integration, hybridization, or to assimilation, absorption by one value of the opposition, or to coexistence, mutual addition of values. Possible ratios between national and universal values in educational space are such, for example if not to mean options of notorious alienation, isolation of one value from others.



Thus, thanks to system and axiological integration there is no opposition and underestimation of personal, collective, national and universal values, and there is their statement, enrichment and completion. The purpose of such integration – not elimination of variety of different values, but implementation of their free choice by each person. Therefore at interaction universal and national values "enter" in individual, but don't "cover" them completely as the person possesses the original, unique part of an inner world which isn't giving in to generalization.

***4. Integration of axiological and system approaches in vocational training of future teachers of chemistry provides consideration of ecological and humanistic values as systems in relation to its integrated components (humanistic and ecological values) and at the same time as subsystems in system of individual values of the school student.*** The axiological components of systems of humanistic [17] and ecological values allocated with us in the course of school chemical education [18] became the theoretical and methodological bases for definition of this direction.

At interface of systems of humanistic and ecological values the only integrated community – system of ecological and humanistic values is formed. To basic it to components we carry the following values: person, it "I", mankind, society, nature, biosphere, Earth, Universe; life, meaning of life, health, healthy lifestyle, health and safety (ecological and chemical safety), safe ecology as life condition; humanity, advantage, self-restriction, communication value; the moral and valuable relation to the nature and people, positive individual ecological responsibility, what and centric ecological consciousness, preservation of the nature and environment for future generation; values of science and culture, scientific picture of the world; values of a free choice and creative activity.

In uniform system – system of ecological and humanistic values – the interrelation of its subsystems, that is humanistic and ecological values, is observed in the following manifestations: first, in expressiveness of the general ecological and ethical culture of the school student; secondly, in results of its ecological, ethical and chemically safe activity, creative products of this activity; thirdly, in the balanced and

harmonious relations between the school student and world around (society and the nature).

In turn, separate values in system of ecological and humanistic values are in close connection: the care of life becomes care of the person, the love to the nature is interfaced to thirst to improve life of society, and the advantage reflecting the attitude towards the "I" is directly and constantly shown through the relation to life of all mankind. Life as such is, life as the phenomenon of the Universe and as gift of Earth is perceived and lived by spiritually developed personality only provided that all system of such values "is mastered by it, acquired and is appropriated". It is impossible to love life, without loving the person. And in the same way there is no love to life at indifference to the nature [19, p. 8]. And therefore the question of formation of ecological and humanistic values can be solved successfully only in the context of formation of all system of individual values of the school student.

***5. Integration of axiological and system approaches in vocational training of future teachers of chemistry to formation of ecological and humanistic values at school students as priority educational values has to be based on the following principles of logical and structural creation of a pedagogical axiology:*** principle of historical and welfare variability of educational values; principle of interrelation of welfare and educational values; principle of correlation of social and personal values; principle of integration of traditional and innovative values. These principles display hierarchy of values of education. These are proponent (knowledge, informative activity, creative activity, communication value), standard (educational standards, moral standards), stimulating (a technique, traditional and innovative pedagogical technologies and values of control), the accompanying values (the values directed on quality of knowledge: educational abilities; understanding the pupil of the studied subjects and the phenomena) which are interconnected and represent the theoretical basis of a pedagogical axiology, promoting formation of the creative, creating activity directed on creation of material and cultural wealth of society [20, p. 113 – 119].

***6. Integration of axiological and system approaches in vocational training of future teachers of chemistry to formation of ecological and humanistic values at***

*school students should be considered as the stimulating innovative educational value-technology.* The hierarchy of values of education given above in the context of the principles of logical and structural creation of a pedagogical axiology became the theoretical and methodological basis for definition of this direction.

Forming ecological and humanistic values, the teacher of chemistry can use integration of axiological and system approaches as: technology – step by step to include, staticize and unite (during development of values) in educational process of value according to the content of chemical discipline and age features of school students; a method – to build interaction with school students on an axiological basis, connecting system of interdependent subject values; reception – quickly ("here and now") to staticize the most significant personal values of the school student for the solution of essential educational and educational tasks. Thus at the beginning of studying of chemistry (teenage age, 7 – 8 classes) such integration is carried out in a foreshortening intellectual and critical, in high school – philosophical and world outlook development of values.

Integration of axiological and system approaches in the course of chemical education for the purpose of formation of ecological and humanistic values of school students can be carried out for the account: detection of the universal axiological regularities essential to chemistry, ecology and other sciences; cultural, historical and what and ethical illumination of the training material directed on detection of its universal and personal importance; figurative metaphorical perception of knowledge thanks to which they receive subject expressiveness and a spiritual and moral painting; interpretations of scientific concepts, events and the facts through a prism of outlook of scientists as carriers of different values.

For realization of such integration it is necessary to use the following system of integration mechanisms: dialog, improvisation, interpretation, identification, extrapolation, individualization, assimilation, conceptualization [2, p. 14 – 15]. Thus, in the course of the integrated development of ecological and humanistic values of knowledge, idea, a problem, the point of view plunge into different semantic contexts

and thanks to the above-stated integration mechanisms their universal and personal importance comes to light.

***7. Integration of axiological and system approaches in vocational training of future teachers of chemistry to formation of ecological and humanistic values at school students provides transformation of ecological and chemical concepts of value, significant for an inner world of the personality.*** Realization of this direction provides, first of all, carrying out conditional differentiation between "values" and "concepts". It is necessary to understand that the term can become concept and at the same time value therefore they are dialectically interconnected. Values at an initial stage are often formulated as concept with more or less steady value, and only in the subsequent integration process they are enriched with additional contexts (historical, cultural, etc.) that is "come to life". Taking into account specified structure of value it is possible to present such components: objective values → objective meanings → subjective meanings [In the same place, p. 9 – 10]. Thus, the essence of integrative development of ecological and humanistic values consists in that values would "recover", were embodied in "flesh" and the same received for the personality semantic vital completeness. For this purpose they have to enter interaction with its inner world and receive the subject importance.

***8. Integration of axiological and system approaches in vocational training of future teachers of chemistry to formation of ecological and humanistic values at school students provides consideration of the world as the complete integrated system (uniform and various) in which the person appears as a component of a picture of the world and bears responsibility for the destiny, life of surrounding people and for the future of the world.*** The theoretical and methodological basis for definition of this direction is the doctrine about unity of the nature and anthropological factor, and also system and structural approach to the analysis of any phenomenon of the nature and activity of the person.

The traditional system of natural education divides the natural world perceived by the school student on physical, chemical, biological, breaking thus his natural-science requirement of complete perception of the universe. Formation of ecological

and humanistic values of school students in the context of complete attitude as conditions of formation of new outlook and development of global thinking provides realization in the content of chemical formation of methodology of system complete approach – a view of the world as on global mutually dependent complete system, as on system of systems: the world is a uniform system which includes local, regional and global subsystems; the world is the integrated system founded on multidimensional interdependence between separate subsystems; the world is the live self-organizing system which cornerstone the principles of a homeostasis, steadiness and balance are; the world is a developing system for which the balanced development is important, and violation of this balance generates global problems [21, p. 239].

Thus, only on condition of system and axiological integration the world around (the person, society, a civilization, culture, reason, live and inanimate nature, ecology, the Universe) is studied not fragmentary, and as one difficult global self-organized system that allows to form complete idea of a sustainable development social and natural environment. And the person is understood as the unique complete personality who develops in the course of active self-realization of the creative potential in system of interaction with other people and the world.

***9. Integration of axiological and system approaches in vocational training of future teachers of chemistry provides further inclusion of the created ecological and humanistic values in structure of chemical and axiological consciousness of the personality and her chemical and ecological competence.*** The theoretical and methodological basis for definition of this direction is consideration of values as the universal, social and cultural phenomena of reality determining value. It allowed us to build a chain system which leads to emergence of chemical and axiological consciousness of the personality: cultural and social valuable orientations → educational values (subject values) → personal meanings (understanding of value of knowledge for realization of own purposes) → individual values → an axiological and socialization of the personality (integration of values) → chemical and axiological consciousness. Formation of chemical and axiological consciousness in

such way perhaps only on condition of the integrated system and axiological perception of chemical knowledge [3].

Taking into account competence-based approach in above the given chain stages which make an integrative essence of axiological and system approaches change: personal meanings (system of values of the individual) → reasonable axiological motivation (switching of valuable orientations to knowledge, its creative judgment) → formation of competences of the personality → chemical and ecological competence [22].

Thus, the detailed theoretical and methodological analysis of the offered directions showed that integration of axiological and system approaches in vocational training of future teachers of chemistry to formation of ecological and humanistic values at school students provides: formation of such complete constructs as "culture", "image of the world", "a natural-science picture of the world", "outlook"; emphasis on contextual (multilayered) thinking which staticizes different scientific and cultural and historical meanings in their indissoluble unity; strengthening of personal axiological motivation which promotes emergence of interest and need for studying of chemistry and professional self-improvement; axiological ensuring communications of all elements of the gained knowledge among themselves; deduction of set of significant values in their complete unity and unique expressiveness, thus values are organically integrated into consciousness of the person and become a basis of his subject relation to the world; prospect of reconsideration of the purposes and problems of teaching chemical discipline, stay in it valuable measurement, an organic and complete exit to discussion of questions, personally significant both for the school student, and for the teacher; further inclusion created ecological and humanistic values in structure of chemical and axiological consciousness of the young personality and her chemical and ecological competence.

Further researches we see in creation of pedagogical system of vocational training of future teachers of chemistry to formation ecological and humanistic values

at school students taking into account the offered perspective directions of integration of axiological and system approaches.

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Роман С. В.

Напрями інтеграції аксіологічного й системного підходів у фаховій підготовці майбутніх учителів хімії до формування еколого-гуманістичних цінностей у школярів

У статті автором представлено теоретико-методологічне обґрунтування дев'яти перспективних напрямів інтеграції аксіологічного й системного підходів у фаховій підготовці майбутніх учителів хімії до формування еколого-гуманістичних цінностей у школярів. У межах цих напрямів така інтеграція передбачає: розгляд цінностей особистості з позиції їхньої єдності, цілісності, тобто системи цінностей; урахування в системі цінностей особистості складної ієрархічної структури; гармонізацію бінарних ціннісних опозицій у системі цінностей; розгляд еколого-гуманістичних цінностей як системи щодо її інтегрованих складників (гуманістичних і екологічних цінностей) і водночас як підсистеми в системі індивідуальних цінностей особистості; трансформацію екохімічних понять у цінності, значущі для внутрішнього світу особистості; розгляд світу як цілісної інтегрованої системи, у якій людина з'являється як складник картини світу й несе відповідальність за свою долю, життя оточення й за майбутнє світу; а також ґрунтується на принципах логіко-структурної побудови педагогічної аксіології; становить стимулювальну інноваційну освітню цінність-технологію; забезпечує подальше включення сформованих еколого-гуманістичних цінностей до структури хіміко-аксіологічної свідомості особистості та її хіміко-екологічної компетентності.

*Ключові слова:* інтеграція аксіологічного й системного підходів, професійна підготовка майбутніх учителів хімії, формування еколого-гуманістичних цінностей у школярів.

Роман С. В.

Направления интеграции аксиологического и системного подходов в профессиональной подготовке будущих учителей химии к формированию эколого-гуманистических ценностей у школьников

В статье автором представлено теоретико-методологическое обоснование девяти перспективных направлений интеграции аксиологического и системного подходов в профессиональной подготовке будущих учителей химии к формированию эколого-гуманистических ценностей у школьников. В рамках этих направлений такая интеграция предусматривает: рассмотрение ценностей личности с позиции их единства, целостности, то есть системы ценностей; учет в системе ценностей личности сложной иерархической структуры; гармонизацию бинарных ценностных оппозиций в системе ценностей; рассмотрение эколого-гуманистических ценностей как системы относительно ее интегрированных составляющих (гуманистических и экологических ценностей) и одновременно как подсистемы в системе индивидуальных ценностей личности; трансформацию экохимических понятий в ценности, значимые для внутреннего мира личности; рассмотрение мира как целостной интегрированной системы, в которой человек постаает как составляющая картины мира и несет ответственность за свою судьбу, жизнь окружения и за

будущее мира; а также основывается на принципах логико-структурного построения педагогической аксиологии; представляет стимулирующую инновационную образовательную ценность-технологии; обеспечивает дальнейшее включение сформированных эколого-гуманистических ценностей в структуру химико-аксиологического сознания личности и ее химико-экологической компетентности.

*Ключевые слова:* интеграция аксиологического и системного подходов, профессиональная подготовка будущих учителей химии, формирование эколого-гуманистических ценностей у школьников.

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