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Journal for Educators, Teachers and Trainers, Vol. 12 (2)

<https://jett.labosfor.com/>

Date of reception: 27 Dec 2020

Date of revision: 24 March 2021

Date of acceptance: 22 June 2021

Pyotr A. Khromenkov, Anna V. Kyuregina (2021). Bioethical paradigm of higher pedagogical education in the conditions of interdisciplinary interaction. Journal for Educators, Teachers and Trainers, Vol. 12(2). 127 – 136.

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ABSTRACT

In the conditions of the ecological crisis the increasing of bioethical consciousness is required. Nevertheless interdisciplinary connections in bioethical training of bachelor students are used unsystematically. Thus generalization of bioethical abilities and skills doesn't take place. The aim of the article is to substantiate the system of students' bioethical training in the conditions of interdisciplinary relations. Methods of comparative analysis and generalizing research results, induction and deduction method as well as modelling were used in the article. On the basis of analysis of theoretical sources devoted to the issues of bioethical training of future teachers and diagnostic estimation of its results under the conditions of subject-centered learning it has been concluded that the formation of bioethical knowledge, skills and competencies is going on in a one-sided manner, without the interaction of natural and social science knowledge. It is proved that the problem has interdisciplinary character and its solution is possible with the help of the system type technology. From the results of the completed research it is determined that the educational process acquires comprehensive bioethical character if it is founded on the joints of natural sciences and social studies and conditions for interknowledge interaction appear within it. The scientific novelty is that the formation model of bioethical training system for pedagogical students is grounded on the interdisciplinary basis. The results obtained can be useful to postgraduates, doctorate students, university professors dealing with the problem of bioethical training of teachers on the interdisciplinary basis.

Keywords: bioethics, higher pedagogical education, natural sciences, social sciences, interdisciplinary interaction, professional and pedagogical activity.

INTRODUCTION

According to the opinion of many researchers, mankind lives in the conditions that are close to the boundary after which life on the planet may disappear. For example, the warning of over 11 thousand researchers from 153 countries of the world about the approaching climatic crisis sounds rather convincing. In their opinion, 60 percent of the conditions of the famous Paris agreement on climate change are not met [1].

Undoubtedly, the solution of the present crisis situation is necessary through the consolidation of all countries and peoples around the fulfillment of the appropriate decisions and obligations. But only a person with bioethical conscience who feels the need to do things aimed at protecting the development of ecosystems is able to preserve living nature. His or her preparedness to it depends first of all on the degree of the systemized natural science and social knowledge formation of the basic value called life. It is definite that a great role in solving these tasks belongs to educators with high level of bioethical culture. That is why educational process in universities should have bioethical orientation. In other words pedagogics of higher education due to its integrative nature should unite pedagogical knowledge, modern natural and social studies. This feature of development of educational theory and practice in postindustrial society is researched by famous scholars on the field of education methodology, such as V. V. Kraevsky [2], D.I. Feldstein [3], V.V. Serikov [4] and others. They prove that deficit of integrated pedagogical knowledge doesn't allow people to solve actual problems of education, society, civilization that is why pedagogy needs researches of interdisciplinary, systemized nature. In this connection we believe that the first serious step to solving many tasks of bioethics in educators' professional work lies in the introduction of a bioethical paradigm into the contents of pedagogical education. We define bioethical paradigm as a combination of diversified bioethical ideas that can be implemented into the

educational process on the level of multidisciplinary interaction of all natural and social disciplines studied by students. From this position we define bioethical preparedness of future teachers as a system of interdisciplinary knowledge about people and other living beings, about their life and conditions of vital activity, about the conditions of habitat, critical ecological and bioethical situations and their consequences; of the bioethical conscience formed; of developed moral attitudes to subjects of life; of needs and general skills to perform bioethical acts.

Issues of bioethics are often researched together with studies of problems of humanism, and bioethical treatment to life acts as its component [5]. Some philosophic works research the relation of anthropocentric and biocentric attitudes of people to animals [6] but without deep constructive reasoning on the way to solving bioethical tasks. Bioethical theme can be traced in the binary discipline ecophilosophy researching the synthesis of knowledge on humans and living nature [7]. Some philosophic works analyze the change of object and subject of bioethics research [8; 9]. It was revealed that bioethics which appeared as an interdisciplinary sphere of knowledge aimed at harmonizing the interaction of people and the environment was later limited to specialized medical issues. At the same time development of both natural and social sciences led to the expansion of the object of bioethics and increasing inclusion of all living beings into it. It should be noted that bioethical issues are gradually penetrating into theology and culturology where origins of religious values, their complex relation with different aspects of language and culture, perspectives of religious norms transformations with the consideration of expanding interscientific knowledge about human and nature are researched [10].

The analysis of literature sources shows that in Russian pedagogy there are researches that offer ways of solving single tasks of educators' bioethical training, within natural sciences. G.V. Geraskina and E.A. Arustamov researching interrelations of human, other living beings, habitat propose methodical recommendations enabling to change students' anthropocentric understanding of bioethical problems for biocentric understanding [11]. The same [12] and other [13] authors make an attempt to reason the way of forming universal cultural competences among students on the example of natural science studies without the reliance on conditions of knowledge integration known in philosophy [14] and didactics [15]. At the same time a tendency to complex research of ecological and bioethical problems has emerged in university pedagogy. For example, T.A. Biruchinskaya substantiates the methodic of developing bioethical thinking of future biology teachers, but in the condition of discipline-centered education [16]. At the same time in world pedagogy there is a tendency to the integrated bioethical approach to training teachers that provides for the development of universal skills, such as efficient communication, self-management, ability for cooperation, for critical and creative thinking through solving problems of society humanization. Meanwhile one of the most important tasks of secondary and higher education is development of moral qualities of educators' personality who should be capable of identifying inhumane decisions and actions in social, economic and other spheres, develop resolutions that are favorable for people, animals and the environment [17].

It should be noted that a number of Russian researchers in the field of natural science are striving to reason the solution of bioethical problems on the example of teaching the discipline of ecology. Some works are devoted to development of bioethical moral attitudes among educators [18]. It is noticeable that in most works the solution of bioethical tasks is analyzed in parallel with solving ecological tasks, sometimes in their interconnection and often independently, within separate disciplines. Significantly enough, international progressive educators solve problems of environmental education basing on the ideas of sustainable development, that is coordinated social problems handling, technological transformations, use of natural resources etc., directed at the increase of people's living standard and implying harmonic co-existence with the environment [19; 20].

One should also point out that works concerned with bioethics and university teacher training can be found in sociology and psychology. The results of researches by B.D. Borokhov and A.D. Borokhov aimed at determining the nature of cruelty stress its interconnectedness with cruelty to animals [21]. D. Mims and R. Waddell investigate the regularities of personality humanism and perspectives of social work based on bioethical thematic among problem children and youth [22]. The research at the intersection of history, pedagogy, psychology and sociology showed that in the American society favorable changes in the direction of humanism took place in periods when work aimed at forming humanistic treatment to the environment was carried out, for example, corresponding laws were passed [23]. M.A. Nikulina analyses sociocultural bases of bioethics, grounds the sociological approach to the use of bioethics as a mechanism enabling people to draw the line between acceptable and unacceptable actions [24]. American researchers M. Gray and J. Coates prove the idea of investigating the problems of society within the context of its interaction with the surrounding world and offers transformative learning, that is changing the world picture through the change of anthropocentric paradigm to a biocentric one, as the basic strategy [25].

In psychology a lot of works are devoted to researching notions, such as "bioethical conscience", "bioethical orientations", "models of bioethical behavior", characterizing the level of personality's bioethical culture. For example, S.J. Zhdanova, L.O. Pusyryova, S.L. Mishlanova research cognitive, emotional and activity components of bioethical conscience [26].

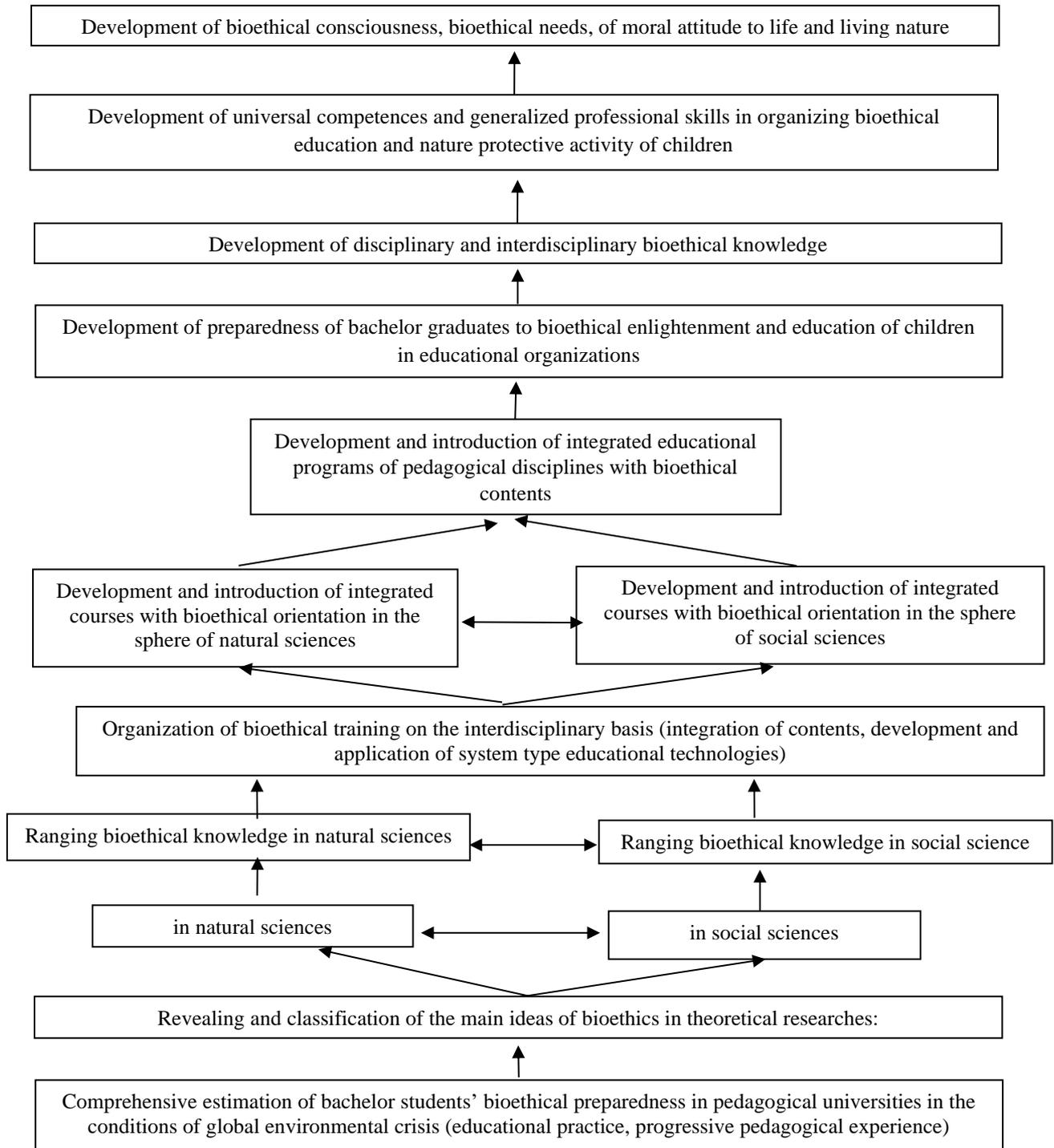
One should also mention the researches revealing some problems standing on the way of integration of bioethical values into education. One of them is connected with the fact that in international education there is influence of commercial interests directed at sustaining consumerism, citing human rights against animal and environmental protection, which interferes with the integration of bioethical values into the educational process [27]. One more widespread problem is that due to lack of bioethical training and appropriate knowledge and skills educators often see anthropomorphism as an alternative to anthropocentrism, which is not equal to the principles of biocentrism [28; 29].

MATERIALS AND METHODS

Experimental work was preceded by comprehensive comparative analysis of literature sources on the theme of research. Progressive scholarly ideas on perfecting the practice of training children and grown-ups to nature protective activities, on implementing human right on safe vital activity, on animal protection and preserving their habitat have been revealed through the methods of generalization, systematization and classification of the main branches of bioethical studies. In this way the theoretical and methodological basis of research was prepared. The idea of its perfection in the conditions of interaction between different natural and social sciences was put forward basing on the expertise estimation of the condition of bachelors' bioethical training in a pedagogical university. As a result the model of forming the bioethical training system of future educators in interdisciplinary interconnection conditions was developed. The pedagogical experiment for proving the actuality of the idea substantiated and for checking the significance of this model was held. The basis of the experiment was Moscow Region State University. The diagnostic stage of the experiment was organized with the help of such methods as observation, questionnaire, primary control of the level of bioethical training in the conditions of traditional education. In view of the requirements to the selection of the number of recipients participating in the research the forming experiment in the conditions of learning on a multidisciplinary basis was held, final results were obtained and analyzed.

RESULTS

Fig.1: The model of forming the system of bioethical training of future educators in the conditions of interdisciplinary interaction



The comprehensive comparative analysis of literature sources on the problem in question has enabled us to determine the range of natural and social sciences interacting in the sphere of key bioethical issues. The directions of research covering the system of higher pedagogical education were defined and the appropriate basic ideas were revealed. It enabled us through the method of expert estimation to carry out the ranging of basic bioethical knowledge contained in natural and social sciences and substantiate the generalized didactic units in the contents of pedagogical education in accordance with the principle of their associativity in the key tasks of students' bioethical training. On this basis the programs of integrated specialized courses and pedagogic disciplines studied by students in accordance with federal standards of the last generation were developed and

approved. Besides the educational technology of the system type aimed at forming disciplinary and metadisciplinary knowledge, universal competences and generalized professional skills necessary in bioethical enlightenment, upbringing, education and activities was developed. The particularity of this educational technology is the combination of information searching, problem orienting and personality orienting technologies of teaching bachelor students. Its essence lies in diagnostic setting and gradual achieving the objections of bioethical training in view of students' cognitive interests and possibilities to choose integrated specialized courses and educational programs. The formation of bioethical conscience, bioethical needs, moral attitude to life and the world of living nature was defined as a criterion of students' preparedness to solve the problems mentioned. Thus the model of forming a system of bioethical training for future educators in the conditions of interdisciplinary interaction presented on figure 1 was developed.

A pedagogical experiment was made for its approbation. The basic task was set and solved on its first stage: to carry out diagnostic estimation of the degree of bioethical knowledge, skills, competences and attitudes formation among students studying in the conditions of subject-centered education with fragmentary use of the simplest binary interdisciplinary connections. The diagnostics was carried out on a ten point scale of estimation in the process of solving the key tasks with bioethical contents. The results of solving two disciplinary bioethical tasks by first, second and third year students are shown in table 1 as examples of solving such problems: forming moral attitude to human and forming moral attitude to animals. Components of students' bioethical training were disciplinary bioethical knowledge, generalized skills and universal competences. The degree of their formation was determined as an average figure.

Table 1: The results of solving the basic problems of students' bioethical training in the conditions of traditional education (before the forming stage of the experiment)

Examples of subject bioethical tasks	Components of bioethical training	Degree of their formation
forming of moral attitude to human	Disciplinary bioethical knowledge:	
	about the evolution of mankind development	5,5
	about the origins of people's humanism and cruelty	4,3
	about material needs of people and ways of their satisfying	7,9
	about moral attitudes to human in various national and religious cultures	4,8
	about group identity and national self-identity	3,3
	about the influence of the habitat on people's way of life	5,4
	about safe conditions of life activity among children and grown-ups	7,1
Forming of moral attitude to living nature	about health saving technologies of education	3,1
	about ecosystems, factors and conditions of their development	2,2
	about species, similarities and differences between living beings	5,6
	about the adaptation of living beings to the environment	2,0
	about possibilities of people to minimize harm to living beings through the transformation of their way of life	1,8
	about using goods, products of plant and animal origin	7,1
	generalized, universal skills:	
	to develop subject programs of education with bioethical orientation	3,4
	to analyze and solve problems basing on inhumane treatment to lives of children, grown-ups and animals	6,1
	to develop active life position among students aimed at protecting the world of nature	4,4
	to develop moral attitude to people, life, nature among children	4,8
to organize learning projects, contests and other collective and individual projects on bioethical thematic	1,3	
	to apply modern methods of bioethical education in multicultural educational environment	2,0
	to analyze the results of educational activity with bioethical orientation	3,3
	universal competences:	
	ability to organize bioethical enlightenment taking into account laws and regulatory acts on environmental protection	3,9
	ability to carry out bioethical education with the account of national and cultural differences among children and their parents	2,9
	preparedness to show positive examples of bioethical behavior towards living organisms	5,1
	preparedness to understand people's role in the world of living nature	6,8

	ability to solve bioethical problems in educative activity	2,2
	ability to develop the striving for self-regulated bioethical behavior among children	3,1
	ability to teach skills of orientating in bioethical information and of carrying out its critical analysis	1,4

The results obtained during the diagnostic stage of the experiment made the basis of integrative programs of psychologic and pedagogical disciplines and specialized courses developed by experts. At the beginning of the experiment control and experimental groups were formed from students studying in the field of pedagogical education. A year after the forming experiment within deferred control in the process of pedagogic practice students carried out a series of bioethical tasks and their results on the example of one task are presented in Table 2. The comparative analysis of future educators' bioethical training results presented in tables 1 and 2 shows the actuality of the problem set and proves the reasonability of using the potential of interconnected natural and social sciences in its implementation. At the same time when summing up the work done we suggest that users of the system type educational technology should ensue the following recommendations:

- For development of metadisciplinary bioethical knowledge, generalized, universal skills and competencies students should originally master methods of connected natural and social sciences on an elementary level;
- Their generalization and synthesis are possible only if students get to know educational metalanguage;
- Bioethical training of students can be efficient only in case when educators master metalanguage culture of organizing integrative learning and cognitive activity and interdisciplinary research.

Table 2: Final results of solving one of key problems of students' bioethical training in the conditions of interdisciplinary interaction (after the experiment)

Example of metadisciplinary bioethical problem	Criteria of bioethical training	Degree of their development	
	Metadisciplinary bioethical knowledge:	Control group	Experimental group
developing moral attitude to the world of living nature	about the evolution of live on earth	7,0	9,3
	about universal laws of development of living nature	6,1	9,0
	about the needs of living organisms and ways of revealing them	4,8	8,6
	about causal links in the existence and development of ecosystems	5,3	9,4
	about the balance in the world of living beings and ways of its sustaining	5,7	8,8
	about the key role of people in preserving the world of living nature	6,2	9,6
	Generalized skills:		
	to develop integrative educational programs of bioethical orientation	4,7	7,2
	to carry out comprehensive analysis, to forecast and to resolve situations connected with relations of people and other living beings in a consistent way	5,0	9,1
	to develop among children the longing for comprehensive and integrative analysis of reliable information about the condition of ecosystems	4,8	7,7
	to develop aesthetic feelings to living nature among children	4,3	7,1
	to organize interdisciplinary contests and projects among children	3,7	8,8
	Universal competencies:		
	ability to organize comprehensive bioethical enlightenment and upbringing of children	4,9	8,3
	ability to see and analyze environmental problems comprehensively	6,8	9,0
	ability to organize professional activity on the basis of interconnected fundamental values "human", "nature", "life".	5,6	8,2
	ability to perceive the holistic world image on the interdisciplinary basis	5,3	8,9
	ability to foresee possible consequences of unwise nature management	4,1	8,0
ability to provide safe conditions of children's live activity in the process of their interaction with living beings.	5,9	9,3	

DISCUSSION

Some difficulties arose in the process of carrying out the literature sources analysis, defining and classifying the basic bioethical ideas revealed in natural and social sciences. They are connected mainly with the fact that most

of them supplementing one another are to some extent coherent. This circumstance required the involvement of experts representing sciences selected by us. Also a certain difficulty in building the model of students' bioethical training of a multidisciplinary basis arose. It was connected with the fact that bachelor students for some reasons don't study modern natural and social disciplines containing important bioethical material. Still an optimal way of forming the contents of students' bioethical training was chosen in the process of building the model. This way proved feasible thanks to the reliance on the basic principles of the theory of pedagogical education integration, the application of the interknowledge interaction mechanism researched by the authors of the given article. Its essence lies in its formation in connection with the key problems and tasks of bioethics.

The analysis of the results of the pedagogical experiment enabled us to observe positive dynamics and definite differences in forming disciplinary and interdisciplinary knowledge, generalized skills, universal competences among students of control and experimental groups. At the same time structural analysis of components of students' bioethical training on the interdisciplinary level in the experimental group shows that such criteria as metadisciplinary knowledge about the decisive role of human in preserving the world of living nature and life on Earth, generalized universal skills to forecast, analyze and solve problems connected with the interaction of people and other living beings in a comprehensive way and their capability of sustaining safe ways of children's life activity in the process of their interaction with living organisms are typical for the greatest degree of its formation. It is explained by the fact that relying on generalized system knowledge about living nature most students understand the decisive role of human factor in its existence and development. The particularity of the results obtained in control and experimental groups is that the same criteria correlate between each other (parallel increase or decrease of indicators is observed) in spite of different approaches to teaching students in these groups. The revealed particularity requires further research with the help of factor analysis in order to reveal other reasons. It also requires system educational technology that have positive influence on the quality of students' bioethical training in the conditions of interdisciplinary interaction.

We suppose that the results achieved should make its further research a priority with the involvement of experts from the spheres of natural, social and technical sciences.

CONCLUSION

Thus, comprehensive analysis of bioethical issues in science, the estimation of bioethical training among future educators in theory and in practice enables us to make the following conclusions. First, actual directions of bioethical research have appeared in the last decade in the conditions of continuing environmental crisis, their thematic in the field of higher pedagogical education has extended. Second, a number of bioethical ideas put forward by scientists representing natural and social sciences enables us to state that in general there are conditions for the application of paradigmatic approach to forming the interdisciplinary system of educators' bioethical training. Third, the results of experimental work show the necessity of consolidating scientists in the field of natural sciences, pedagogics and other social sciences in order to develop integrative programs of bioethical education and their integration into the educational process of pedagogic universities. It is this approach that enables to develop the personality of educators who are competent in solving vital problems of bioethical education. We assume that the materials developed by us can be used in further theoretical researches of the problem and applied in educational practice in the interdisciplinary interaction conditions with the use of the newest scientific data on human and living nature.

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