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Education in the context of interdisciplinary paradigm in the transitional period

Introduction. The analysis of the current socio-cultural situation both in Ukraine and the world shows that the education system undergoes fundamental changes in the context of the challenges of the 21st century, caused by the systemic crisis of human civilization. Accordingly, the modern paradigm of education development in Ukraine should have a pro-active character and promote the introduction of innovative trends in the educational sphere. Special consequences of global economic recession, impacts of development and use of information technologies in everyday communication, changes in the pace and style of people’s social and individual life in the direction of their intensification, growth of individual responsibility and creativity, and finally, Europeanization or internationalization have become some of the challenges for modern education. Fundamental changes occurring in education require an intellectually developed personality, capable of self-education and self-improvement that should be based on new theoretical and methodological principles and also fundamental knowledge. The above stipulates the need to formulate the requirements for education in the transitional period.
The National Doctrine of Education Development in Ukraine facilitates national self-identification and development of Ukrainian culture. It also proclaims that education should become a strategic resource for improving people’s well-being, ensuring national interests, strengthening the authority and competitiveness of the state on the international scene.

Nowadays, every new progress in the field of education is being carried out due to increasing of the integration of scientific disciplines to solve complex problems that reflect the objective reality - complex, dynamic, uncertain. So the interaction of various branches of scientific knowledge in solving problems of development of modern education becomes very important. ‘Education as a whole is a field of complex research, interdisciplinary approach and system analysis, since it is a “system” object, as well as its main problem situations are system ones’ (Kremen, 2014).

The analysis of recent research of education in the transitional period suggests that interdisciplinary paradigm is getting more important as it facilitates the implementation of new educational ideals of the formation of a holistic system of knowledge and skills of the individual, the development of its creative abilities and potential opportunities. The modern pedagogical vision of educational problems is largely based on the achievements of pedagogical theory (V.G. Kremen, G.O. Ball, I.D.Bekh, S.U. Goncharenko, M.V. Grineva, A.V. Ivanchenko, C. F. Klepko, N. V. Kuzmina, V.O. Molyako, A.O. Rean, V.V. Rybalka, A.A. Sbrueva, S.O.Sisoyeva, M.M. Soldatenkov, M.D. Yarmachenko, et al.). Many recent studies have focused on the issues of interdisciplinarity (J. T. Klein, A.F. Kolot, S.F. Klepko, V.G. Kremen, J. R. Lawrence, J.F. Lyotard, M. de Mello, E.N. Morin, W. H. Newell, A. T. Nuyen, T.Remadier, et al.).

However, the real state of affairs in the field of education, the pace and depth of transformation do not fully meet the needs of the individual, society and the state. Therefore, the purpose of this paper is to define the essence and distinguishing features of the transitional period, and to formulate the requirements for education in this period in the context of interdisciplinary paradigm.

Discussion. The phenomena and processes contained in interdisciplinarity are sufficiently complex, multidimensional and multivectoral. Therefore, it is difficult to give a complete description of this phenomenon in one, though broad format. For a comprehensive description of the category of multidisciplinary, it should be considered from several positions.
Certain historical conditions in the 20th century created a need for the phenomenon of interdisciplinarity to exist. Leading theorist of interdisciplinarity W. Newell (1998) states, ‘understanding the role of disciplines in interdisciplinary studies should be central to a full understanding of interdisciplinarity’ (p. 15). Interdisciplinarity refers to the general phenomenon of combining or integrating disciplinary perspectives. Klein (1990) provides quite a comprehensive definition of interdisciplinarity, ‘Interdisciplinarity has been variously defined in this century: as a methodology, a concept, a process, a way of thinking, a philosophy, and a reflexive ideology. It has been linked with attempts to expose the dangers of fragmentation, to re-establish old connections, to explore emerging relations, and to create new subjects adequate to handle our practical and conceptual needs. Cutting across all these theories is one recurring idea. Interdisciplinarity is a means of solving problems and answering questions that cannot be satisfactorily addressed using single methods or approaches’ (p. 196). According to Klein (1990) and Newell’s (1998) studies on the phenomenon of interdisciplinarity, we can distinguish its basic characteristics to be as follows: it draws on multiple disciplinary perspectives; it involves a process for addressing questions or solving complex problems; it works towards the integration of multiple disciplinary insights due to the creation of a comprehensive perspective; it promotes correction, complementation, and boost of the restraints of disciplinary approaches.

The phenomenon of interdisciplinarity is especially relevant for education as it applies to all branches of knowledge. Thereby, we should focus on the awareness of new challenges in the field of interdisciplinarity and conceive reasons, circumstances, and trends that necessitate the interdisciplinary approach to modern education in the transitional period.

It is extremely important to get convinced that the goals we face in the field of interdisciplinarity are far from those that they were several years ago. The amount of tasks increases, they become more and more complicated. Why is it so? What is the catalyst, the root causes? Why is the idea that the future of education is in interdisciplinarity emerging more and more often?

The first reason is the incredible complication of economic, cultural, social and managerial systems and relevant institutions. Modern information society forms a new model of world perception. It creates a situation in which the traditional school and education formed in the framework of another type of cultural communication,
within the framework of another culture of thinking, communication, and values, ceases to meet the needs of the present. Interactivity and individualization are now embedded in the latest communication systems purely technologically. The electronic format originally envisages a manifestation of creative activity. Virtual art, networking literature, the practice of communication in networks, the huge information potential of the Internet testify to new forms of creative activity and the formation of the person of a new type who is quite far from “man of mass” dominating in an industrial society. These circumstances require revising accepted pedagogical principles.

In the nineteenth century, in general, it was possible to formulate a unified system of requirements and create a unified system of education. But then culture itself was unified. Today, the situation is different: there is the pluralism of cultures and heterogeneity of culture. As a result, there is a plurality of subjects and heterogeneous requirements for education. At present, we are not dealing with a single pedagogical practice. On the contrary, different, substantially different types of pedagogical practices (traditional education, religious, esoteric, new humanitarian education, etc.) are formed in response to a poly-cultural and multicultural civilization situation as well as freedom of educational choice. In each of these practices, education is understood differently, various pedagogical practices are offered: nonlinear dialogue, arousing learning, learning as inactivation, adaptive learning, as well as many others.

The emergence of a set of pedagogical practices indicates the “transitional” period of society and culture. The transitional period today is not institutional knowledge, open and sincere, transferred through the Internet. Moreover, this knowledge is reflexive and fragmented by somebody unknown. The usual ways of thinking are crashed, related not so much to the rationality, but to irrationality. This leads to the creation of a new mythology, to change the of the language, since old reality is lost, and the new one is not defined yet. Therefore knowledge cannot be “determinative”, it can rather be called “experiencing”.

The transitional period results in quite a difficult situation for education and pedagogy, since it becomes impossible to understand who a school should form, what are the ideals of an educated person; as a result - difficulties and fluctuations in determining the goals and content of education. This means that soon, large pedagogical programs for reforming education have little comprehension. This is, perhaps, the same situation as in the field of social programs. In modern pedagogical
research, the viewpoint is spread, according to which scientific research both in the field of education and pedagogy should obey the general structural constant that provides the fundamental order in all systems. The development of scientific thought demonstrates that nonlinear systems function in many situations much more flexibly, increase the ability to adapt and respond to unpredictable, changing conditions and influence them. This can be fully attributed to both social and pedagogical phenomena of the present.

For a transitional period in which society, culture and pedagogy exist nowadays, it is important that in the process of their progress they all undergo similar changes at the stage of system formation, rules of connection between invariants. All the sciences, anyhow, experience a certain degree of uncertainty at various stages of their historical development. Conceptual apparatus of pedagogy is noted to be rather ambiguous. This leads to the fact that the main categories that are already formed differ significantly. Therefore, the teacher-scientist is forced to conduct research on the formulation of the basic concepts in a “synergistic atmosphere”.

This situation means that neither the deductive stage of the study nor the extremely productive system approach, can solve the difficult problems that arise during the transitional period. Moreover, the education system is a dynamic one, and therefore the method of combining nonlinear relationships between their parts is compatible with all real relations as a medium of their existence, which is achievable through the interdisciplinary approach that can open the essence of the present.

M. Foucault (1996) in his paper “What is Education?” wrote, ‘I want to say that the work carried out by our own forces should, on the one hand, open the field of historical research, and, on the other hand, start studying contemporary reality, while tracking the points where changes would be possible and desirable, and determining precisely which form these changes should have. After all, in experience it is known that attempts to “escape” from the modern system and to give the program of a new society, a new culture, a new vision of the world do not lead to anything other than the revival of the most dangerous traditions’ (p. 52). Applying the interdisciplinary approach, we overcome the possibility of the latter option, which will impede the development of education.

As a result, the behavior of entire systems is predicted by the behavior of individual components of a system. This phenomenon is significant for pedagogy, because the teacher works with students like solving
equations with multiple unknowns. If you have a model where the main components of the whole system are known, it will help avoid mistakes when adopting a defined strategy of cooperation. Concerning the above mentioned, the interdisciplinary approach takes place when it is necessary to determine how knowledge, talents, and professional interest of the group members are combined into a force that prevails the outcome which could be obtained by a separate member of a group working outside the team. In this context, modern pedagogy is a system of interaction between the teacher and students, which has the effect of improving the creative potential of the team, which ensures the realization of a new goal that is training the team with the acquisition of an indirect creative product by those who learn. Consequently, modern education is capable of responding immediately to the demands of the external environment, and, therefore, excludes a situation where the unexpected internal structure of reality causes the failure of purely speculative constructions.

The application of the multidisciplinary approach to education does not include anything false or mechanical reduction. The fact is that in the synergetic nonlinear picture of the world, unlike all previous scientific pictures of the world, the starting point is volatility, procedural, the formation of a new whole, that is, all that characterizes the processes of self-organization occurring in non-linear, non-equilibrium environments. The stability, which served as the basis of the previous pictures of the world, is also present in the philosophy of nature, but now it is the relative dynamic structure of dissipative structures or the transitional structure of complex fractal systems that are formed in the boundary areas of competition between various attractors of deterministic chaos. In any case, stability is associated with the “cooperative movement” of many elements of the environment, which is characterized by a few parameters of the order.

Thus, a real possibility of a scientific description of complex systems has appeared, including education, which is an open system as well. We should also consider that the computer revolution has created strong means for the implementation of computational methods for solving nonlinear equations, for computational experiment and computer simulation as methods for describing complex systems of different nature. In this sense, modern education optimizes the communication and development of an information product through the use of innovative means of the computer environment. Such education uses the latest methods of information processing for the implementation of training. A
teacher in the learning environment can be presented both physically and virtually. A virtual learning method can contribute to the development of a new area of science and practice - the development and creation of multimedia intellectual learning environments. The openness of education is a collective organization of work based on synergy and the use of computer network technologies and also the processing of information based on intelligent technologies. This approach will provide a high level of intellectual culture, as well as the ability to involve computer in the process of working with text material.

In the context of interdisciplinary formations, modern education is possible on the boundary of several disciplines such as philosophy, psychology, the theory of social communication, computer science, logic, linguistics, etc. It should also consider the results of its observations and experiments that have been obtained in the learning process. In turn, the learning process, which should be “open”, is the integration of existing knowledge in society and the organization of obtaining an innovative, creative product. The main task of education in this case is to create conditions for obtaining synergy, which would ensure the acquisition of new knowledge. Similar to the term synergetics, the term synergy means the aggregate interaction of several factors, when the result is greater than that which can be obtained with the sum of individual components. Synergetics, as a science of complex systems, solves somewhat different tasks.

In order to create synergy in the learning process, it is necessary to involve students in solving a real scientific or practical problem that is consonant with their educational, research, and life interests. Here the student can feel his significance and responsibility for the results of his research. Furthermore, each result of such research is both an integral part of personal “information baggage”, and at the same time, it is a step towards serious scientific work. The transition to multidimensionality will qualitatively expand the consciousness when each measurement is perceived not in isolation, but in solidarity, in a holistic unity. In the process of studying, the student learns about his scientific interests and benefits. This kind of understanding forms the ability to perform complex activities.

Modern pedagogy concentrates on high-quality education and the upbringing of the younger generation, the timely detection and multiplication of natural genetic instincts, giftedness that appears early in life. Therefore, it is important for pedagogy to form a child’s ability to active
creativity, socially new qualities corresponding to dynamic, forward-looking changes of a society. Nowadays, intensification of education and the formation of personal qualities appear to be a universal human need. In education, the emphasis is made on the cultural-educational model, where the assimilation of the systematized foundations of science, the socio-cultural role of education and upbringing prevail. Improvement of the educational system, expansion of the sphere of social pedagogy is accompanied by the rejection of authoritarian pedagogy and student’s personality coming to the fore, the satisfaction of his requests, the development of his individual creative abilities and talents.

In the process of education, the natural ability of the mind to develop and solve the most important problems should be developed and, accordingly, the full utilization of the general ability of thinking should be encouraged. To mobilize mental forces to the maximum, a free movement of curiosity is required, this most widespread and most powerful ability of childhood and adolescence, which is often damped by instructions. This ability should be constantly stimulated, or if it “sleeps”, awaken. Fulfilling its mission, which ‘consists of the comprehensive development of the overall person’s ability to think, in the future education should be organized to use existing knowledge, to overcome the contradictions that arise as a result of progress in specialized areas of knowledge, and to identify distorted rationality’ (Moren, 2007, p.36).

The problem of creativity in the educational process assumes that reproductive rather than productive (creative thinking) occupies a dominant position in the system of modern education, reproduction of materialized information has become the main criterion for the effectiveness of educational processes. Conventional approaches to structuring the content of education “serve” the mode of obtaining ready data, without producing their intellectual product, i.e. constructive (productive) knowledge. Only strictly systematic structuring provides the conditions for finding relationships, for the “birth” of thought, that is, for creative thinking.

Reproductive thinking is caused by the fact that the lack of freedom of choice in both domestic and professional activities was typical for domestic social relations. Therefore, an executor was formed, being unable to make decisions for self-determination, and, consequently, to form his thinking, his intelligence. A “repressive” educational system has fulfilled a social order for such a specialist-executor. As a result, the category of creativity in pedagogy acquired a specific meaning as the
property of an exclusively gifted personality. However, creativity is a manifestation of spirituality, a special spiritual state of man, a moment of “enlightenment”, understanding, and elevation over everyday life. In the process of learning, every student (pupil, scholar) repeatedly manages to understand, improve his own subjective discovery of the truth, as he is the creator. He has created his own opinion, continued the other people thoughts, developed an intellectual and sensory-emotional product; he forms himself as a smart person. Therefore, all-natural predispositions are activated, and in this aspect everyone is gifted and capable of creativity. In this case, the main task of education is to identify these abilities.

A new methodological paradigm is to discover this discrepancy in the educational process. The general philosophical direction of scientific cognition, which reveals ways to study the functioning of the whole society, its communities, or an individual personality in specific historical and cultural conditions, is at the heart of modern methodological approaches to the study of the holistic process of socialization, upbringing and development of personality. According to Haken (2003), complex systems are made up of a large number of individual parts, elements or subsystems that ‘through their cooperation can produce spatial, temporal or functional structures ... These structures are not imposed from the outside, but organized by the system itself’ (p. 112). That is the system of self-organizing. The main purpose of these self-organizing systems at this stage of social development is to overcome the existing gap in philosophy and sociology from other social sciences and humanities, which bring pedagogical research closer to specific socio-cultural conditions. This determines the integrity of the sciences.

The notion of “integrity”, as well as the development of theories of self-organization, covers all spheres of socio-cultural life. The essence of human existence is to observe the rules of the “game”, in which the power of self-organization in the systems of nature (including the human body) can exhibit its constructive side, since man has a higher-order parameter that concentrates his creative potential. Failure to comply with these rules leads to a disturbance of equilibrium, i.e. integrity. That has happened today in education and pedagogy; therefore, the problem of overcoming this crisis is actualized. Concerning modernity, it is important that structures are flexible, variable, but retain their main features, although their individual elements can be replaced. Thus, ‘nonlinear development of the system determines many alternatives to the manifestation of their properties. In fact, an element with a change in its rank in the population
can radically transform the structure of links, their input and output information flows, while having invariable formal parameters. Its rank in the population may vary, based on changing environment. At the same time, an element can change its place in the system structure, and another element will occupy its place’ (Medvedev, 2010, p. 163). After all, the world consists not of things, but of their interactions. These are interactions that have to define properties, not the existing objects. This is the way to integrity, therefore, to overcoming of the crisis.

An example in this context is that joining European and global education space will only be productive when both domestic education receives positive results from such an entry, and European humanitarian space is enriched when interacting with national traditions in the field of education. It is neither about ignoring the globalization factor, nor the desire to preserve any traditions that have lost their meaning. We are talking about the possibilities of a more creative approach to the problem of integrity, to self-organization. Understanding the interaction of the “whole” and a “part” enriches both “whole” and “part”, as well as the definition of the complex as a condition for self-organization.

Being open systems, education and pedagogy should form the structure of the individual who understands these rules. This approach involves sequential movement of scientific views towards integrity, not they’re refusing to develop. Only through the understanding of the norms and rules of the development of nature, a person can become free and conscious indeed, which opens the way for the formation of a new, creative, holistic thinking. Among the top-priority tasks we can distinguish the creation of the necessary, most favorable conditions for self-realization, self-development of a particular person using intellectual, emotional, moral, cultural, informational and other vectors of personality formation.

The structure of education is determined by two factors: the structure of the activity and the structure of the object of study, which is the surrounding reality. The environment acts as the determinant of the content of education indirectly, i.e. through scientific knowledge. This causes the need to analyze the influence of the structure of scientific knowledge on the structure of the content of science and education. According to the classification of scientific knowledge, pedagogy should be defined as the science, which object and subject are characterized, first of all, by the processes of information exchange. Pedagogy is a science that studies the essence, patterns, principles, methods and forms of organization of the
educational process. The pedagogical process is a specially organized interaction (chain of interactions) between the senior and junior (teacher and student). The purpose of this interaction is conveying by the elders and developing by the younger social experience that is necessary for life and cooperation in society. Thus, pedagogical activity is understood as a problem of the relationship between upbringing and education, which is the development of two main aspects of the man’s holistic spiritual world - its ability to recognize the world through gaining the knowledge acquired throughout the history of science and its ability to evaluate everything that exists, including itself, building in its consciousness a certain hierarchical system of values.

**Conclusions.** Education will be able to work ahead, identify current trends and development directions, and also fully perform its mission only if the methodological principles of scientific research are updated. The component of such a renewal is the comprehension of a modern research methodology, which requires the full use of the potential of the interdisciplinary approach.

In the conditions of the formation of a new education paradigm, narrowly detailed, narrowly disciplinary delineation of educational issues are becoming counterproductive. Interdisciplinarity in its broadest sense is a trend, a problem and a global issue. A variety of circumstances and causes that are multi-layered, multi-vector and contradictory actualizes this issue.

Modern phenomena and processes occurring in the field of social and economic development require a philosophical, socio-cultural, socio-spiritual reflection as never before. Thus, interdisciplinarity is one of the brightest examples of the present, which is the integral element of the future of scientific research and the development of higher education.

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DIAK TETIANA. Освіта в контексті міждисциплінарного пара-дигми у перехідний період. Стаття присвячена питанню міждисциплінарним аспектам освіти у перехідний період. Визначаються поняття сутності та основних рис освітнього процесу у перехідний період. Досліджуються роль та місце міждисциплінарних зв’язків, розглядаються вимоги до освітнього процесу щодо вирішення комплексних проблем сьогодення з метою задоволення потреб особистості, суспільства і держави. Встановлено, що перехідний період сьогоден характеризується появою множини педагогічних практик, спричинених плuralізмом культур, і отже, різними вимогами до освіти. Формулювання цілей та змісту освіти мають відбуватися в синергійній атмосфері. Інтенсифікація освіти та формування особистісних якостей сьогоден но постає як загальнолюдська потреба. Наголошується, що проблема творчості як прояву духовності стає головним критерієм результативності освітніх процесів. Серед першочергових завдань
висувається створення необхідних, найбільш сприятливих умов для самореалізації, саморозвитку конкретної особистості засобами інтелектуального, емоційного, морального, культурного, інформаційного та інших векторів становлення особистості.

Ключові слова: освіта; міждисциплінарний підхід; особистість; навчальний процес; синергія; творчість.

ДЯК ТАТЬЯНА. Образование в контексте междисциплинарной парадигмы в переходный период. Статья посвящена вопросам междисциплинарных аспектов образования в переходный период. Определяются понятия сущности и основных черт образовательного процесса в переходный период. Исследуются роль и место междисциплинарной связи, рассма триваются требования к образовательному процессу по решению комплексных проблем современности с целью удовлетворения потребностей личности, общества и государства. Установлено, что переходный период сегодня характеризуется появлением множества педагогических практик, вызванных плюрализмом культур, и следовательно, различными требованиями к образованию. Формулирование целей и содержания образования должно проходить в синергетической атмосфере. Интенсификация образования и формирование личностных качеств сегодня являются общечеловеческими потребностями. Отмечается, что проблема творчества как проявления духовности становится главным критерием результативности образовательных процессов. Среди первоочередных задач выдвигается создание необходимых, наиболее благоприятных условий для самореализации, саморазвития конкретной личности средствами интеллектуального, эмоционального, нравственного, культурного, информационного и других векторов становления личности.

Ключевые слова: образование; междисциплинарный подход; личность; учебный процесс; синергия; творчество.

DYAK TETYANA. Education in the context of an interdisciplinary paradigm in the transitional period. The article “Education in the Context of Interdisciplinary Paradigm in the Transitional Period” by T. Dyak deals with the issues of interdisciplinary approaches in education in the transitional period. The problems of the essence and distinguishing features of education in the transitional period are defined. The role and place of interdisciplinary bonds as well the requirements for the educational process to meet the needs of the person, society and state are substantiated.
The transitional period is revealed to be characterized by the emergence of a set of pedagogical practices caused by the pluralism of cultures, and, consequently, different requirements to education. The formulation of the educational goals and content should take place in a synergistic atmosphere. Intensification of education and the formation of personal qualities appear to be a universal human need nowadays. The problem of creativity as a manifestation of spirituality is emphasized to become the main criterion for the effectiveness of educational processes. Thus, the creation of the necessary, most favorable conditions for self-realization and self-development of a particular person by means of intellectual, emotional, moral, cultural, informational and other vectors of personality formation are found to be the most important tasks.

Keywords: education; interdisciplinary approach; personality; educational process; synergy; creativity.