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UNIVERSAL MATRIXES OF KNOWLEDGE AS AN IMPORTANT EDUCATIONAL RESOURCE

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Voznyuk Alexander, Habilitated Doctor of Education Sciences, Professor of Zhytomyr Ivan Franko State University has more than 700 publications (some of them are represented: http://eprints.zu.edu.ua/view/creators/0412043E0437043D044E043A3A041E2E_04122E3A3A.html) covering such scientific spheres: development of integrative courses in the system of professional training of preschool and primary education prospective teachers; the methodology of teaching foreign languages; the problems of teacher's personality development; special pedagogy, inclusive education, the problems of psychotherapy and psycho-correction of children with special needs, a theory of knowledge synthesis; a new paradigm of education, the pedagogical paradoxology, the synthesis of science and religion, a comprehensive study of a man; the pedagogical historiography, the social psyche of the Ukrainian people; the system analysis and universal model of the Being; a general theory of influence and anti-manipulation technologies; acmeology and synergetic paradigm (in education, psychology, philosophy, sociology, economics, natural sciences); environmental and aesthetic education, noospheric education and healthy lifestyles.

The urgency of the problem. The amount of information on our planet doubles each 10–15 years. The deepening of the process of sciences specialization has brought about the situation when the volume of publications in some scientific spheres is practically boundless. That is why complex studies, directed at the synthesis of scientific views and facts within certain set of problems, are of particular interest.

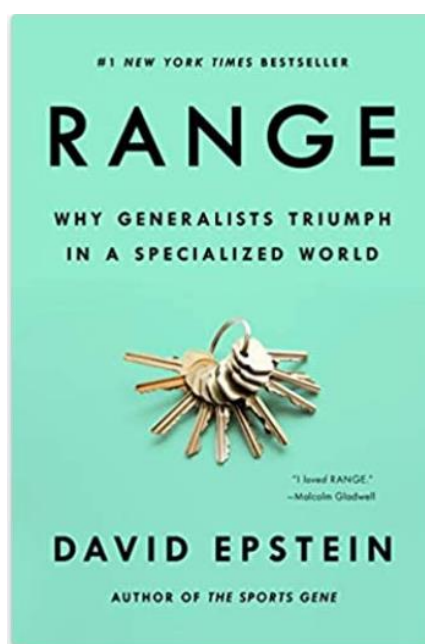
Analysis of recent research and publications. So, the aspiration of modern scientific world to the synthesis of knowledge due to the interdisciplinary research presupposes the development of complex studies focusing on fundamental problems of the world (F.Capra, A.Maslow, G.I Naan, Yu. A Urmantsev, and others [2; 5; 7]) since the achieving of understanding a certain phenomenon requires its holistic envelopment. And this can be done on the ways of complex interdisciplinary research thus revealing a new and at the same time well forgotten cognition aim – *the wholeness*.

On the level of educational systems the wholeness is embodied in such important aspects and principle of education as *fundamentality of educational content, pedagogical integration and universality of knowledge*. Information boom requires the corresponding orientation of education, specifically the system of higher education, at fundamentalization and universality of knowledge, their interdisciplinary nature, the formation in the prospective specialists the ability to use this knowledge in the condition of rapid changes in the fields of modern production and educational technologies. *The pedagogical integration* in the context of the educational process involves the comprehensive application of both philosophical and general scientific, and specialized knowledge – their synthesis – when the transfer of ideas and methods from one science and theoretical plane to the other is the basis of a creative approach

to man's scientific, engineering, artistic activities in contemporary conditions of scientific and technological progress and civilization changes.

The essence of the principle of *fundamentality and universality of knowledge* can be expressed in a number of provisions: 1) Fundamental interdisciplinary knowledge is not limited to the fundamentals of scientific knowledge. 2) Fundamentality of scientific knowledge is not limited to scientific and rational knowledge, it also involves scientific intuition. 3) Fundamentality of knowledge is based on the scientific and philosophical reflection of the teacher, although this knowledge is adapted to the "conceptual system" of the student. 4) Fundamental interdisciplinary knowledge includes both knowledge on man's reflection and meta-knowledge, thus realizing the unification of knowledge. 5) Fundamentality of knowledge means its versatility and focusing on the perception and understanding of the world ascertain wholeness. 6) Holistic knowledge system is the most important criterion for its fundamentality, so fundamentality of knowledge reveals its integrity, non-classical and problem character. 7) Formation of fundamental knowledge being one of the most important processes of fundamentality of education and pedagogical integrating presupposes its systematization, taxonomy, qualification, methodology, cybernetization, problemization, mathematization, cyclization in the organization of knowledge

Just in case, Bill Gates named five books one needs to read before the year is over. One of the books is: 'Range: Why Generalists Triumph in a Specialized World' by David Epstein (2019), New York, Riverheads Books. 340 p.



Some citations taken from this books:

"And he refused to specialized in anything, preferring to keep an eye on the overall estate rather than any of its parts... A Nykolay's management produced the most brilliant result" (Leo Tolstoy, 'War and World').

"No too; is omnicompetent. There is no such thing as a master-key that will unlock all doors" (Arnold Tunbee. 'A Study of History')

"In *Range*, author and journalist David Epstein exposes the fallacy behind the specialization myth and how society benefits more when people are generalists. It is those

who seek broad experience in diverse fields that become innovative and creative problem-solvers, ready to tackle problems that seem unfamiliar and complex.

David Epstein challenges the well-known concept that in order to perform at the highest level, you must find your niche at an early age and train for hours. While it is true that some of the best athletes and musicians began learning their craft at an early age, for example, Tiger Woods, the majority of these great individuals were actually generalists. They started out in one field, dabbled in a bunch of others, and finally settled on their true calling. Epstein states that people shouldn't be afraid of becoming generalists because the exposure will make them better abstract thinkers than narrow-minded specialists"

The purpose of the report. On the level of the wholeness the system of knowledge is realized in the sphere of the universal matrixes of knowledge. The outlining of some of its major knowledge matrixes is the purpose of the abstract.

The main content of the report. We live in a holistic world where everything is interconnected and stands in universal bonds with everything (the dialectical law of universal ties of all phenomena of our world) due to the cause-effect relations (total determinism when, according to synergetic methodology, even chaos can be understood as order constituting phenomenon). This truth is realized in such theoretical and practical entities. 1) The concept of fractal-holographic building of the Universe. 2) The paradoxical phenomenon of quantum physics: on the fundamental photon level of the Universe it is a holistic entity where such oppositions as the part and the whole, inner and outer, the simple and the complex, cause and effect... are not differentiated. 3) The anthropic cosmological principle according to which the physical laws regulating the existence of our Universe are in very subtle reciprocal coordination, thus creating the conditions for man's existence.

So we can outline very few fundamental physical laws and regulations which, in their turn, are embodied in the universal matrixes of knowledge (Figure 1).

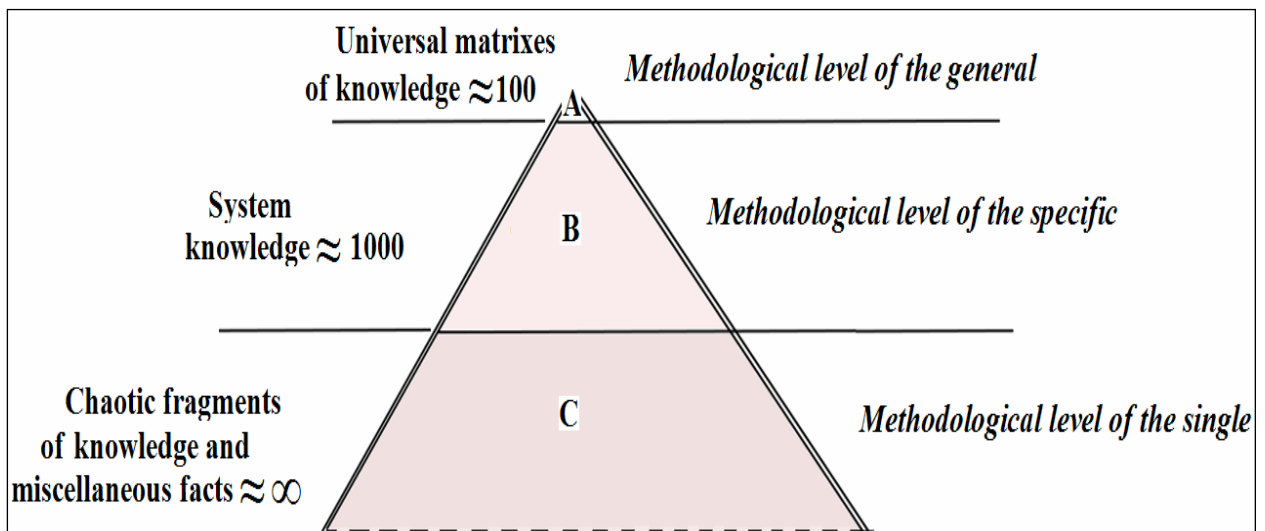


Figure 1. The pyramid of knowledge

In modern educational establishments the students are taught approximately to 1 % of A, to 10 % of B and 90 % of C. Let us dwell on some major matrixes of knowledge.

1. The general system theory as universal matrix of knowledge # 1

"The law of system rearrangements" (which, as Yu.A.Urmantsev believes, is a system universalia revealing seven possible fundamental types of all systems) states that any object as a system entity is reconstructed (transformed) in seven ways: by changing the quantity, quality, relationships between the elements, or one of the possible combinations of these features. If the presented characteristics are designated as: A (relationship), B (quantity), C (quality), and then we get four additional connections: AB, AC, BC, ABC. Consequently, there are seven methods of forming systems: A, B, C, AB, AC, BC, ABC. In a graphical form, this procedure takes this form (Figure 2).

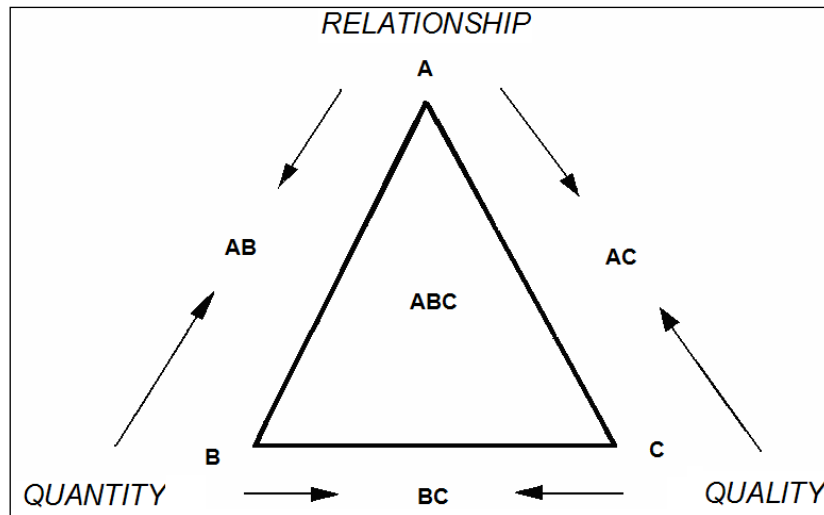


Figure 2. The principle of system representation of reality according to Yu.A. Urmantsev.

Let us consider the model of pedagogical space.

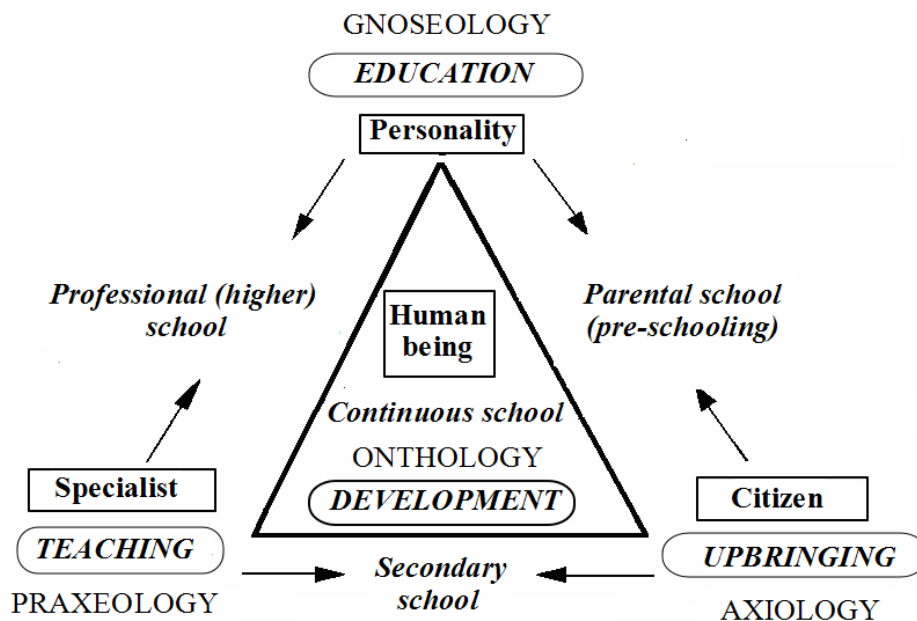


Figure 3. Model of the space of pedagogical reality.

The presented model of the space of pedagogical reality finds realization in practical aspects of the achievement of the three pedagogical goals: due to the analysis of the educational documents of Ukraine, the goal of education is the formation of a harmonious personality, a patriotic citizen and a competent specialist, which corresponds to three pedagogical goals (teaching, upbringing and developing), as to three social forms of human development (pre-schooling, secondary school, higher school), as well to three ways of transformation and development of reality by a man (axiology, praxeology, gnoseology).

2. The main aspects of the universal paradigm of development being the universal matrix of knowledge # 2:

Any motion is, first of all, a wave, whose structure is universal, since it fixes ascending and descending branches, as well as the points of maximum, minimum and zeroes of the function, being the wave's "beginnings of stabilizations" (Figure 4).

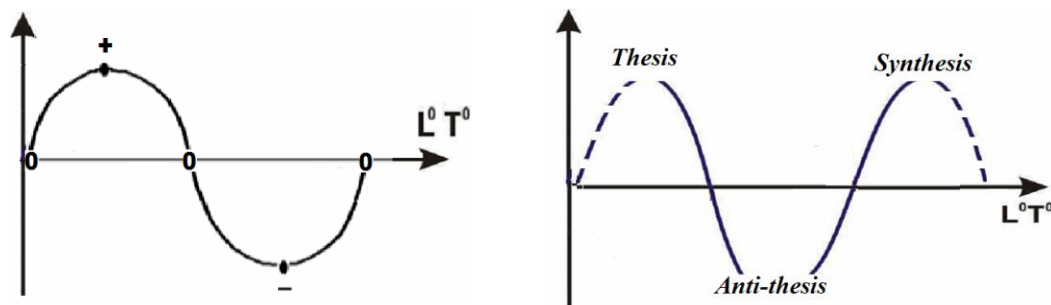


Figure 4. Sinusoidal development model.

The wave is a universal form of realization of any movement, change, development: it combines the diachronic and synchronic aspects of the Universe. For on the one hand a sinusoidal, or conical spiral, being the fundamental image of the wave, reflects the linear-sequential development process, and on the other – it basically reiterates the same pattern when it executes a constant return to the maximum (or minimum) points, which is embodied in the phenomenon of particle-wave dualism, theoretically regulated by N. Bohr's principle of complementarity, affirming the unity of the continuous and discontinuous, wave and corpuscular: opposites are not polar, but complementary, that is, they represent oneness. Thus we have the Hegelian triad developmental model: *thesis* → *antithesis* → *synthesis*:

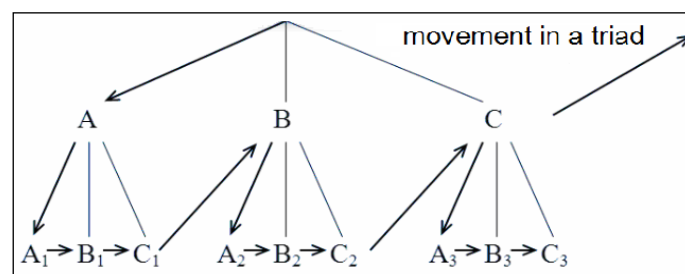


Figure 5. Hegelian triad developmental model.

The principle of isomorphism of structural and dynamic aspects of the world, from which we proceed while conceptualizing the universal model of development, allows drawing a

conclusion about existence of certain universal paradigm of any development/motion, idea of which is found in the works of practically all well-known thinkers.

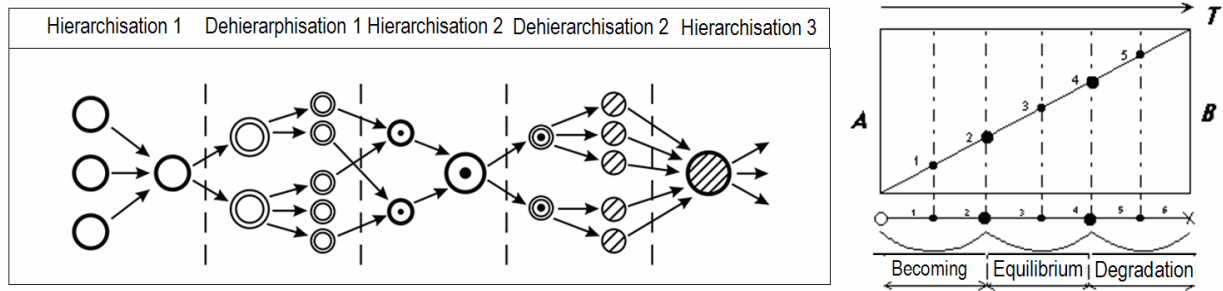


Fig. 6. Synergetic three and six phase models of development

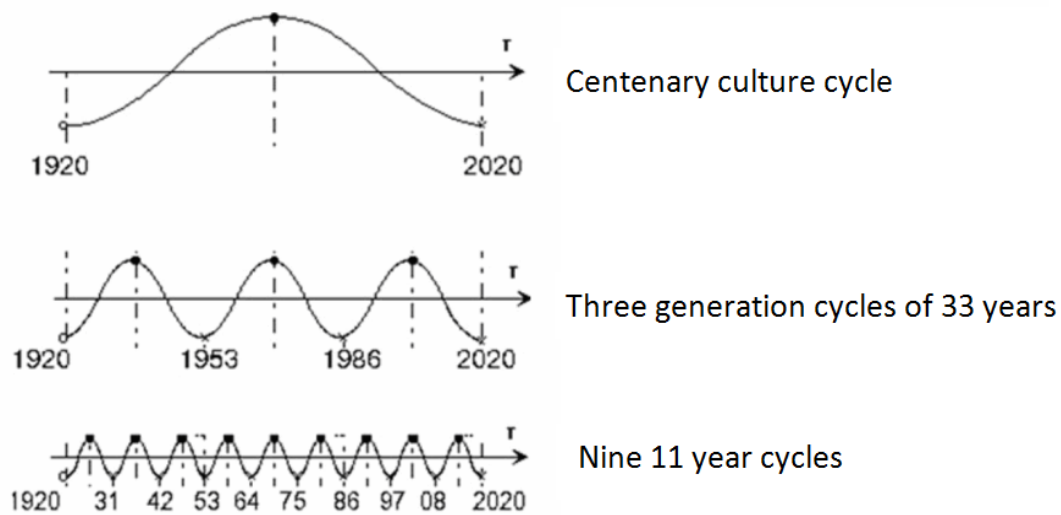


Fig. 7. Illustration of the phenomenon of fractal nesting of different historic processes

These models in invariant form can be represented in the form where three cycles coexist – local, global and mega-global (Fig. 8).

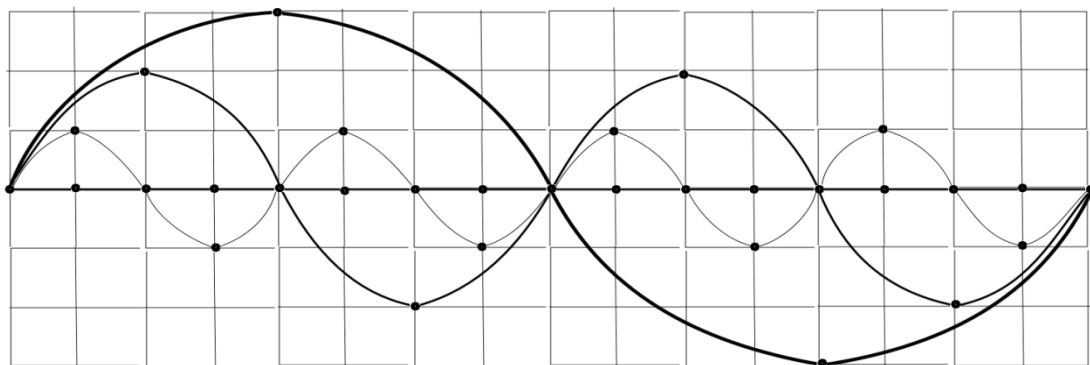


Fig. 8. Fractal nesting of three cycles – local, global and mega-global

The constructed universal model is reflected at the level of development of education and pedagogy in the context of global and local processes. Let us consider the development of education and pedagogy on a global level.

Thesis. Primitive societies. Subject-subject state of teacher-pupil integration, "direct" transfer of knowledge is realized through spontaneous act of mystical initiation or joint activity.

Antithesis: Societies of Modern Times. The subject-object state of differentiation of teacher and pupil, the transfer of knowledge by the rationalize oriented teacher is mediated by subject-object relationships of all members of educational process.

Synthesis. The civilization of so-called Knowledge Society (or Information Society). The subject-subject state of integration of teacher and pupil (who are in equal position to the Truth), knowledge transfer is initiated as the process of birth of knowledge.

3. The concept of functional asymmetry of the hemispheres of man's cerebrum as universal matrix of knowledge # 3

On the level of higher psychic functions (on the level of cerebrum hemispheres), we can also observe the realization of the principle of holomorphy, since both hemispheres reflect and master the world in the opposite ways: **right hemisphere** embodies *continuous-field* aspect of the world, forming an ambiguous polysemantic, artistic context of world view, building sacral-religious, metaphoric reality; **left hemisphere**, on the contrary, embodies *discrete-substance*, plural aspect of the Universe, forming strictly one-semantic, unambiguous, abstract, discursive-theoretical world understanding, constructing rational-technocratic reality [1; 2; 3; 9].

Functional unity of the hemispheric information processing strategies, which is found, as EEG studies indicate, in meditation state [6], enables to actualize "the moment of truth", illumination, authentic, intuitive-meditative perception of the Being, being here both single, and plural, both complex, and simple... when actually-real, on the one hand and potentially-possible, on the other, are not differentiated (which, by the way, is observed on the fundamental quantum level of the matter).

The mentioned data can be extrapolated on educational systems: the state of hemispheric harmony presupposes a sufficient developmental level of the two hemispheres. A traditional educational paradigm focuses mostly on the development of abstract and analytic (left-hemispheric) thinking, thus revealing the fact of certain underestimation of the importance of right-hemispheric (emotional and imaginative) processes of psychic activities. But relevant investigations show that right-hemispheric function activation ensures a respectively significant stimulus for the development of left-hemispheric form of psychic activity [8]. Thus it is urgent to work out *a new post-nonclassical paradigm of education* which is to provide the unity of sensational-empirical and abstract-theoretical spheres of personality's actualization. So, the unfolding of the right-hemispheric aspect of a person is urgent, thus revealing the theoretical and applied value of this new paradigm having much in common with *pedagogical synergetics*.

Conclusions. The information boom (that creates the situation when science as the form of social consciousness in the process of scientific research discards the classical tradition to cite all the predecessors when cognition and the history of cognition will have to be separated) reveals the arguable necessity to substantiate some universal knowledge basis for all sciences. This basis is built on the universal matrixes of knowledge (these are about 100) being the realization of the phenomenon of wholeness of the Universe.

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