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Professional Culture of the Specialist of the Future

**SYNERGETIC PRINCIPLES IN FORMATION OF THE FUTURE
SPECIALIST PROFESSIONAL CULTURE**

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Abstract

This paper is devoted to the problem of synergetic ideas use for the development of the educational environment for the future specialist formation in high school. The actual stage of pedagogical science progress is characterised by its active interaction with other sciences. This problem can be solved only in interdisciplinary research progress. It concerns pedagogics, too because of its special features as a science. In our opinion, pedagogics requires fresh ideas, offers, theories and the concepts that are beyond a classical pedagogical science. Various approaches to the educational environment definition were analysed. Application of seven main principles of synergetics in pedagogical science was analysed and on their basis the principles of designing of the high school educational environment were formulated. The model of the educational environment that can be used as a basis for designing of corresponding training system by the teacher of higher school was offered. This paper is aimed at studying the principles of specialist's professional culture formation in conditions of modern education environment. The paper presents various aspects of education environment. The materials of the article are of practical value for specialists realizing their professional activity in the field of education, post-graduate studies, and fundamental problems of high school education process.

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1. Introduction

The processes of scientific differentiation and integration, synthesis of scientific knowledge, transferring research methods from one area to another characterize the modern stage of science development. These features of modern scientific knowledge promote the search for new ways of education sphere development. The global education is aimed at the formation, improvement and development of the multidimensional creative personality who perceives the world holistically and is able to be active in professional and social spheres. The current post-non-classical stage of science development is characterized by the real understanding of the extreme complexity of the studied objects, as well as the deep limitations of our intellectual and technical assets. The term post-non-classical science does not mean the refusal of the modern non-classical worldview. It represents the following revolutionary transformation of science, its new phase. The formation of post-non-classical science is associated with synergetic ideas primarily. Synergetics is not a distinct scientific discipline, and integrative scientific field or research program (Arshinov & Budanov, 2014; Budanov, 2014; Stepin, 2005), having a holistic look. Diverse research areas and directions found common conceptual ground in synergetics. With the appearance and popularization of synergetics, the ideas of non-linear development and self-organization have attracted scientists to consider the existing systems of different nature on the base of universal methodology. It has been predominant since (Knyazeva & Kurdyumov, 2001, 2008).

The appearance of synergetic methods and conceptions in education is logical. It reflects a new stage in the development of synergetic knowledge – the stage of synergetic methodology formation. At this stage, it is necessary not only to systematize the accumulated methodological and theoretical developments, methods of their use in various spheres of knowledge for the solution of research tasks, but also to develop mechanisms of learning these techniques, in other words, to provide not only production, but also adequate reproduction of synergetic knowledge (Lozovskij & Lozovskij, 2006; Stepin, 2005). The use of synergetic principles in the pedagogical research and development of the modern higher school educational environment will ensure its functioning at a new level that meets modern scientific picture of the world.

2. Problem Statement

The problem is the formulation and justification of the principles of synergetics in the formation of professional culture of the future specialist. The use of synergetic principles corresponds to the modern scientific picture of the world and allows to bring the consideration of professional culture of a specialist to a new level. Differentiation of sciences in a combination to synthesis of scientific knowledge, research methods carrying from one area in another, integrative processes characterize the modern scientific knowledge development. These features of a modern science help to search for new ways of formation development of XXI century which overall objective is to grow up not the narrow expert, owning in great volume of the information, and the multivariate creative person completely perceiving the world, capable to operate actively in professional and social spheres. Realization of the given purpose is carried out in following conditions:

- The differentiation of sciences is combined with integrative processes, synthesis of scientific knowledge, integrated approach, and the research methods passing from one area in another.

- Only on the basis of integration of separate sciences conclusions and results of different areas the experts can make research of a scientific problem.
- Sciences become more and more exact owing to wide use of the mathematical device.
- The modern science develops in time and space, the break between the scientific idea and its introduction in manufacture is reduced.
- Today all the scientific achievements are considered as results of a collective activity, as an object of public planning and regulation.
- The research of objects and the phenomena is conducted systematically, in a complex and promotes the synthetic thinking formation.

The concept “a postnonclassical science” has appeared in philosophic and research literature under influence of works by Stepin (2005). The newest period of scientific history based on synergetic ideas has been fixed. The postnonclassical science formation is connected with synergetics. The synergetics does not represent a separate scientific discipline. It is an integrated scientific direction, or the research program getting a complete form (Knyazeva & Kurdyumov, 2001, 2008). Some decades ago, these questions were in the competence of philosophy. Now they rise in a concrete context of physical, chemical, biological problems. The theory of self-organizing or synergetics helps in their solution more and more.

Distinctions between the systems existing in the nature, and the ones created by the person, are obvious. The coordination of all components, stability to influences, growth, development, an opportunity to self-complication, self-renewing are peculiar to the first. For the second sharp deterioration of functioning even is characteristic at rather little change of external influences or mistakes in management. Hence, the experience of construction of the organization saved up by the nature is necessary for using in our activity. One of synergetic problems is finding-out of organization construction laws, the orderliness occurrence. In this scientific paradigm, the accent is made not on managerial processes and information interchange, but on principles of the organization construction, its occurrence, development and self-complication (Budanov, 2014).

Let us consider how seven main principles of synergetics can be used in pedagogical and educational systems in general (Budanov, 2014). In education environment modelling, we have used seven basic principles of synergetics: two principles of Being, and five principles of Formation. They have been proposed in (Budanov, 2014), (Knyazeva & Kurdyumov, 2001, 2003). Two *principles of Being* (homeostaticity, hierarchy), characterize the "order" phase, the stable operation of the system, its rigid ontology, transparency and ease of description. Five *principles of Formation* (non-linearity, instability, openness, dynamic hierarchy, observability) represent the phase of system transformation, upgrading, its passing sequentially through all stages of the death of an old order, chaos testing of alternatives and the birth of a new order.

The principle of Homeostasis means that the system keeps its program functioning in some framework that allows it to move towards the purpose of its existence. For education systems, for example, it is manifested in using the basic laws of an individual and society development, taking into account of psychological features of trainees in the organization of the education process.

The principle of Hierarchy means the composite nature of the higher to the lower. In language, for example, the hierarchy is implemented in the presence of words, phrases, texts. In the world of ideas, the

hierarchy is expressed in the existence of opinions, attitudes, ideologies, paradigms, etc. In pedagogy, for example, we can observe the hierarchy of educational levels, educational institutions, the hierarchy of competencies in personality structure, etc.

Non-linearity means the acceptance of multiple ways of development. In education system, the content of education changes constantly. It is inconsistent with the system of competences of students now, which forces the teacher to change the trajectory of education constantly. There is a nonlinearity, of both process and outcome. The outcome of the educational process is significantly different from the intentions of its participants. In addition, the nonlinearity of the pedagogical process is the ability to define an individual trajectory of education, the pace of a student to achieve different levels of education, select the type of educational institutions, disciplines and teachers, forms and methods of training individual tools and techniques, creative tasks.

Instability. In the point of instability (bifurcation), the system becomes open to other levels of existence, to influences. The ever-increasing educational information space displays pedagogical system and pedagogical process of stable equilibrium.

The openness means the impossibility of neglecting the interaction of the system with its environment. In pedagogics, the principle of openness is a necessary condition for the pedagogical process self-organizing, when the existing methodologies do not deny, but complement each other. This makes it possible to use a variety of pedagogical approaches, methods and techniques of teaching, the complexity and polyphony of the cognitive processes seamlessly. A pedagogical system can be considered as open, because it is undergoing the process of exchange of information (knowledge) between teacher and students (feedback) and focused extraction of information. New goals, methods and means of teaching appear constantly. When considering the process of formation of student's personality as a process of self-organization and self-development we should keep in mind contacts and its interaction with the external environment (group mates, parents, teachers, etc.). For example, the teacher assumes the flow of information and energy, encourage a future specialist for self-organization and self-development, formation of his personality. This interaction from the position of synergetics should possess a number of features. A student may be considered as a disordered, chaotic system that has an infinite number of degrees of freedom. Upon contact of this system with the external environment (in our case with the teacher and not only him), when it absorbs information and energy from another system there is a reduction in the number of degrees of freedom. This is the essence of self-organization. Hence, the influence of the teacher is a part of the optimal, reasonable limits on the freedom of choice and is of a managing nature.

Dynamic hierarchy represents the basic principle in the system bifurcation point. It means the presence of stages of birth, growth and death, the emergence of a new quality system.

Observability means the limitations and relativity of our perceptions about the system in the final experiment. Pedagogical processes are characterized by their uniqueness. In the study of natural phenomena (physics or chemistry), the researcher can repeat the experiment using the same materials, while not limiting in time. In pedagogics and all the other education sciences, this approach is impossible. During the second study, we have already to deal with other "materials", and over time, the old conditions are never repeated (Kureychik & Pisarenko, 2010, 2013, 2017). All these facts prove that the education processes have properties of non-equilibrium (the dependence of process characteristics from time and space), the

nonlinearity (an ambiguous dependence of the teaching performance from other factors) and openness (information exchange between subsystems and the environment).

2.1. Synergetic ideas and phenomena in pedagogical systems

We can observe other *synergistic phenomena* in education and pedagogical systems (Ignatov, 2001; Kröger, 2015; Steklova, 2004). It proves that synergetic methodology is universal and it helps to study, to understand better social phenomena, and to consider them as a part of general process of development. Let us consider some of them. The process of self-organization is the spontaneous emergence of relatively stable existence of open non-equilibrium systems, new structures, process or a set of processes in the system contribution to the maintenance of its optimum functioning, promoting self-construction, self-repair and self-transformation of education system. Self-organization in the education system presupposes the existence of a specific interaction between the trainers and trainees that meets the requirements of the development of the pedagogical system and follows from the objective conditions of its self-movement. It allows us to understand the mechanism of pedagogical process development. Chaos in the education system is present in all its components: the presence of a huge information field for various academic disciplines in which the learner will navigate and build a certain logical structure; the existence of a large number of pedagogical approaches, technologies, methods, ways, and receptions of the organization of the educational process. A teacher will navigate there in accordance with academic standards and its own vision of the educational process. There is no single solution and approach to problem situations. It is also the emergence of pedagogical situations of uncertainty; disorganized and spontaneous aspirations of the learner, etc. The randomness in the education system represents a departure from the rigid curriculum, the emphasis on the importance of improvisation, intuition, ability to change the whole scenario classes because of the seemingly random replica of the student or other "small" events. The process of qualitative changes happens in the area of bifurcation (branching), where at the bifurcation point, the system selects its new structure of multiple alternatives. This new structure is capable of dissipation, of the entropy production and of the future evolution. Bifurcation in the education system represents alternative ways of the fan of possibilities in the choice of information and technological support of the educational process. It is also the critical moment of uncertainty about the future development of the student, when he is aware of the need for further development; as well as the moment of awareness of the need for further cultural and professional development of teachers arising from dissatisfaction with his activities, problems encountered in teaching practice, etc. The further work with the literature and reflection on the studied problem may lead the teacher to a point of bifurcation, when system sensitivity is exacerbated to the extent that the minimum accidental exposure may cause rapid irreversible process, called "catastrophe" in synergetics. We speak about well-known "butterfly effect", when some random factor (the thought expressed by somebody, an empirical fact given in some article, the result of the pilot study, the scheme given in the book or phrase, dropped by a colleague, etc.) leads to the fact that a variety of previously disparate views are combined into a new well-ordered structure (Kureychik & Pisarenko, 2017). An attractor in synergetics is understood as a possible relatively stable state, resulting from the evolutionary processes in open nonlinear media. In a pedagogic system, for example, when a teacher passes a bifurcation point his further work is aimed at giving a new socio-cultural frame to his points of scientific views. It means to hone the wording, to find additional

arguments, to make links, i.e., to generate a text corresponding to the attractor. However, if a teacher is under the influence of some other random factor at the bifurcation point, the development of his system of scientific views could go in a completely different way. An attractor in a pedagogic system can be a system of competences. Its formation in student's personality can represent a target of the functioning of the entire educational system (Kureychik & Pisarenko, 2010, 2013, 2017).

2.2. The problem of educational environment

The problem of creation of the higher school educational environment is not new. The process of informatization of all areas of scientific life explains the widespread use of relevant terminology in scientific research (Arsaliev, 2016). The term educational environment has come from computer science. Changes in the world scientific picture, namely, the adoption of the universal evolutionism concept in modern science, which is based on evolution as a biological phenomenon, determined the popularity of biological terms, one of which is "environment". Analysis of the literature on the development and implementation of educational environment showed that, first, the creation of the educational environment can be considered as an approach in the organization of innovative training. Secondly, the concept of educational environment has multiple levels: educational environment of a university, a subject (discipline) educational environment etc. Thirdly, it is necessary to ascertain a diversity in consideration of the concept of educational environment, its components, content etc. by various authors. For example, Gusev (1997) considers this approach as the design and implementation of educational environment based on the integration of professionally oriented and socially developing educational technologies that enhance cognitive activity of students in the university. Chvanova (2000) has proposed another approach, based on ideas of technocracy. She introduces the concept of a professionally oriented educational environment. It is considered, firstly, as a set of tools and technologies for the collection, storage, transmission, processing and distribution of educational and professionally oriented information; secondly, as a set of conditions conducting to the emergence and development of information interaction between teacher, learners and tools of information and communication technologies. Another approach has been suggested in (Vilenskij, Obratsov, & Uman, 2004). In accordance with this approach, you need to create at the University a "special professionally-oriented education environment, integrating into the set of inherent information and technological components of educational process informatization". The authors mean a special environment, filled with professional subject-oriented content that meets the requirements of training specific skills in the university. Dictionary on pedagogy defines environment as the totality of conditions surrounding a person and interacting with him as organism and personality. Dictionary of modern general education considers the educational environment as "1) a set of educational factors based on the principles of environment; 2) view of the environment, factors which have an educational nature" (Tyumaseva et al., 2004, p.257). Chernilevskiy notes that educational environment represents an expanding sphere of life of a growing person, a student, including an increasing richness of its culture-mediated relations with the world. Educational environment teaches to extract knowledge from his or her own activities, observations and perceptions, to reveal the vital importance of the objects being studied (Chernilevskij, 2002). Yasvin defines the educational environment as a system of influences and conditions for personality formation in accordance with a given sample, as well as opportunities for its development contained in the social, spatial,

and subject environment (Yasvin & Rybinskaya, 2015; Yasvin et al., 2015). Analysis of these definitions and many others (Bauer, 1987; Colton, 1977; Swaminathan, 1987) has allowed us to propose our own definition of the educational environment in modern information space as the sphere of activity defined by the educational interests of the person and by its needs in information exchange with the environment.

3. Research Questions

Thus, in the study of the problem of formation of professional culture, our attention is focused on solving the following research questions: What kind of educational environment should be created to solve the problem of effective formation of professional culture of the future specialist at the University? What synergetic principles underlie the functioning of the modern educational environment? What synergetic principles form the basis for the development of the process of formation of professional culture of the future specialist?

4. Purpose of the Study

The aim of the study is to consider the possibility of use of synergetics principles in the formation of the future specialist professional culture.

5. Research Methods

The proposed purpose and objectives of the study identified a wide range of complementary research methods, namely: theoretical and constructive (analysis, synthesis, abstraction, generalization, analogy, comparison, opposition, idealization, modelling, classification, functional, procedural, structural design, etc.); empirical: private (observation, analysis of creative works, written works, questioning, conversation, interview, psychological and language testing, etc.), complex (monitoring, experimental training, ascertaining and forming experiments); methods of mathematical statistics in data processing. In our study of the professional culture of the specialist and features of its formation, the main one was synergetic approach. The diversified scientific areas and directions have found the general conceptual ground in synergetic direction. The problematic, the maintenance, methods of researches and results, connected to synergetics, are characterized by ambiguous estimations and uncertainty. At the same time, the synergetics as a scientific research direction is demanded by a society.

6. Findings

Having used different methods in consideration of education environment we concluded that professional culture of a specialist can be formed if educational environment represents a system of models presented in Figure 01 (Kureychik & Pisarenko, 2010, 2013, 2017). Taking into account the positions of personality-oriented paradigm, systemic, activity approach, and the methodology of innovative training, discussed above, we represent a variable professionally oriented educational environment as an integrated model. This model consists of five independent, but interrelated and interdependent models: a model of a specialist's personality, a model of a discipline, a model of a learning process, and models of student and teacher's personality (Fig.1). Let us specify that the concept model of personality is used as the most adequate for the representation of people – participants of education process. Here an individual is

considered as a social being, formed in a particular system of social relations, in our case – in education relations. Model of a specialist's personality reflects the requirements for fundamental, theoretical, special and practical training, the professional qualities of a future specialist. This model plays a bridging role in education environment, brings together all the other components. A general model of a specialist is formed in the process of disclosure and analysis of the abstract and the concrete in the activities of different specialists. The study of theoretical works and empirical analysis of different types of activity allows to allocate the following main function blocks: motivation; goal setting; planning; information; decision-making; the subsystem of professional qualities of a specialist (Kureychik & Pisarenko, 2013, 2017).

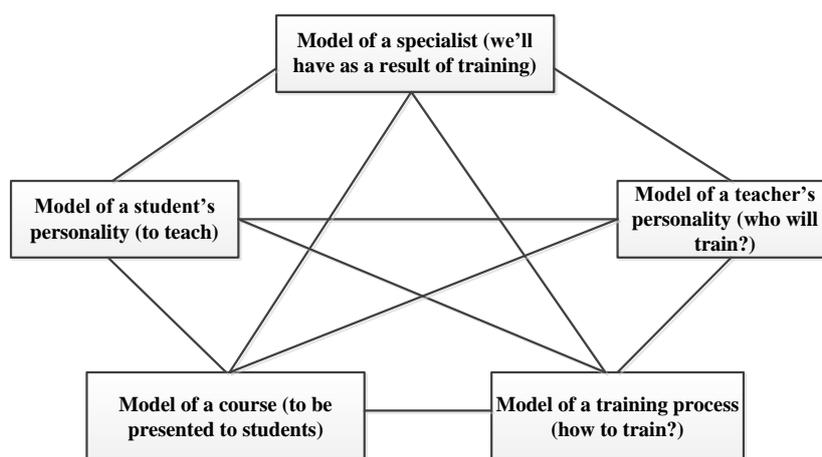


Figure 01. Integrated model of professionally oriented educational environment

Changes in society impose new requirements to specialists and the quality of their training. They are formulated as a list of basic competencies. In accordance with the personality-oriented education paradigm in the education standard of the higher educational institutions, it is necessary to provide mechanisms that help to shape spiritual qualities of an individual. Therefore, the objectives of the educational process at the University may include: 1) forming the base of common cultural and professional competences; 2) spiritual and moral development of an individual (Arsaliyev & Dendiyeva, 2014); 3) the creation of active civic and professional positions; 4) development of communicative and information culture. In accordance with the objectives, the core competencies of a graduate can be represented by three blocks: cultural competences are formed and developed primarily in the development of disciplines of humanitarian, socio-economic trends and natural sciences; methodological competences are the result of studying of disciplines of a general professional block; professionally oriented competences related to the disciplines of specialization.

The model of a concrete specialist differs in content. We can observe differences in the models of the same specialist assigned to different levels of education (bachelor, master). These differences can occur in the set of parameters of the expert and the criterion values for individual parameters.

The model of the student's personality is a specific set of characteristics of an individual student, who is waited to be a highly qualified specialist to perform the functions of a specialist in a particular field of employment. This model allows a teacher to analyse and consider psychological, physiological and socio-psychological qualities of a student in their teaching activities, level of his preparedness to work with

the information resources, level of competence in various disciplines, the training that was carried out in high school, or University, if it is not a first-year student (Kureychik & Pisarenko, 2017).

Model of a teacher's personality contains the personal qualities of the teacher and his professional competence required for successful teaching. Personal qualities include professional quality, depth of knowledge of subject area disciplines, the possession of teaching methods with modern approaches, methodologies, methods, techniques and technologies of learning. The model of the discipline includes learning objectives, features of professionally-oriented system of knowledge and competences, the extent and depth of their formation, information-based and didactic requirements: scientific content, regularity, sequence learning, visualization. The model of the training process reveals the features of implementation of teacher instructional capabilities of technology to learning.

When creating a professionally oriented educational environment for the study of a particular academic discipline the teacher should develop all models progressively in accordance with the requirements of the model of the specialist training which is used in this University (Pisarenko, 2017). Use of modelling method in the development and study of educational environment allows to represent the object in the totality of all its components. Modelling also allows to trace the connections of the various components.

Let us consider *professional culture* as a synergetic phenomenon in the context of modern scientific world picture based on synergetic paradigm. The process of qualitative changes in personal sphere of a future specialist happens in the area of bifurcation (branching), where at the bifurcation point, the system selects its new structure of multiple alternatives. This new structure is capable of dissipation, of the entropy production and of the future evolution. Bifurcation in the education system represents alternative ways of the fan of possibilities in the choice of information and technological support of the educational process. It is also the critical moment of uncertainty about the future development of the student, when he is aware of the need for further development; as well as the moment of awareness of the need for further cultural and professional development of teachers arising from dissatisfaction with his activities, problems encountered in teaching practice, etc. The further work with the literature and reflection on the studied problem may lead the teacher to a point of bifurcation, when system sensitivity is exacerbated to the extent that the minimum accidental exposure may cause rapid irreversible process, called "catastrophe" in synergetics. We speak about well-known "butterfly effect", when some random factor (the thought expressed by somebody, an empirical fact given in some article, the result of the pilot study, the scheme given in the book or phrase, dropped by a colleague, etc.) leads to the fact that a variety of previously disparate views are combined into a new well-ordered structure (Kureychik & Pisarenko, 2013, 2017). An attractor in synergetics is understood as a possible relatively stable state, resulting from the evolutionary processes in open nonlinear media. In a pedagogic system, for example, when a teacher passes a bifurcation point his further work is aimed at giving a new socio-cultural frame to his points of scientific views. It means to hone the wording, to find additional arguments, to make links, i.e., to generate a text corresponding to the attractor. However, if a teacher is under the influence of some other random factor at the bifurcation point, the development of his system of scientific views could go in a completely different way. An attractor in a pedagogic system can be a system of competences. Its formation in student's personality can represent a target of the functioning of the entire educational system (Kureychik & Pisarenko, 2013, 2017).

Let us formulate the following principles of the professional culture development in educational environment of a higher educational institution in accordance with the synergetic paradigm of human sustenance based on the new logic of the formation of worldview, and on the basis of analysis of scientific literature on the problem of professional culture modelling and functioning.

The principle of harmonization and humanization resulting from the synergetic principle of openness, when the existing methodologies do not deny, but complement each other. Humanization and liberalization should be a major consideration in professional culture formation in educational environment. It is realized in humanitarian orientation of professional culture by means of increase the weight of the Humanities in the training of future professional; in improvement of humanitarian accents in teaching professional disciplines. *The variability principle* results from the synergetic principle of non-linearity. Education and training of a high-level specialist is carried out on the multiple and alternative basis. Points of instability are associated with the choice of further trajectory of education. The conflict of styles in the training process leads to the change of trajectory of study. This principle is realized also in the mastery of ways of thinking and abilities. *The principle of comparative analysis of values systems of a student's personality and the one of other members of society* resulting from openness and instability principles. The development and improvement of the student's personality is performed on the basis of comparison of the student's own system of personal meanings that are accumulated in the culture (Abakumova et al., 2006). The disciplines of a humanitarian cycle have a special potential in this case. *The principle of non-linearity of interaction*: the functioning of the educational environment can be considered effective if it is a nonlinear process of human interaction with the intelligent environment in which the person perceives it to enrich their own inner world and makes it ripe for the multiplication capacity of the environment. *The principle of openness of professional culture*: it should be an open system. It means that it consists of subsystems, between which there is a constant exchange of information; it is a subsystem of a system of higher order, and it exchanges information with other its subsystems. *The principle of plurality* means the plurality in the process of values and further ways of development selection. Usually the choice of culture values is determined by semantic importance of the studied realities for the student. The process of training includes a variety of trends, accompanied by natural and managed processes of destruction of old and the emergence of new systems of search and acquisition of new meanings. *The principle of self-development* means that the process of professional culture development cannot be controlled in reality. A teacher provides and supports the flow of information and energy and encourages a future specialist for self-organization and self-development. It contributes to the formation of his personality. *The principle of profiling of educational environment* means that the development of professional culture while training a future specialist is made in the context of future professional activities. It means that all disciplines that are filling the educational environment, providing overall development of an individual, are somehow connected with the future profession. *The principle of visualization of studies*. The ability of productive imagination and creative intuition get new impulses for development by the immersion of a person in a virtual reality simulated by a computer. Due to synergetic ideas, the connection of two complementary ways of understanding the world - understanding through the image and through the number becomes possible. All this will develop professional culture. According to *the principle of individualization of learning*, we assume the definition of the student as an active subject of knowledge, using the basic laws of development

of an individual, society, the reliance on a subjective experience of the student, his personal psychic and psychophysiological features of communicative abilities. This principle follows the synergetic principle of homeostasis, i.e. maintaining the program operation of the system in some framework that allows it to follow its target (Genov, 2018; Howard, 2007). *The principle of multicultural base* of a future specialist's personality development (Jun, 2016; Mahiri, 2017) means that professional culture is a component of general culture, a very complex phenomenon including many elements. We have to take into consideration that we are living in polycultural world. The cultures are very different and they have to exist in one world. That is why we have to speak about multicultural character of modern world.

7. Conclusion

Using the above-mentioned synergetic principles in considering the professional culture of the future specialist, we have made the following conclusions. Professional culture of a specialist is a personal growth having an integrated character; integrated character is manifested in the fact that the professional culture of a specialist combines elements of the general culture and components of professional competence of a specialist. Professional culture of a specialist is an open system, as it is constantly evolving and interacting with the information field. Professional culture is a self-developing system; with the accumulation of knowledge, skills and it allows the individual to move to a new stage of development and develop further; self-development occurs in the process of improving competencies. The development of professional culture of a specialist is nonlinear; this means that a specialist always has some ways of development; he has to choose one way and to follow it up to the following bifurcation point.

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