

# Information Technology for Formation and Implementation of the Personal Trajectory of a Future Specialist's Success in the Information and Educational Environment

Elvira Luzik<sup>1</sup>[0000-0001-8853-379X], Anzhelika Kokarjeva<sup>1</sup> [0000-0002-6025-4235], Olena Hurska<sup>1</sup> [0000-0003-1015-2983], Olga Veselska<sup>1</sup> [0000-0002-4914-2187] and Tetiana Konivitska<sup>2</sup> [0000-0002-4569-3563]

<sup>1</sup>National Aviation University, Kyiv, Ukraine

<sup>2</sup>Lviv State University of Life Safety, Lviv, Ukraine

luzik\_nau@ukr.net

**Abstract.** The article is devoted to considering and solving the problem of finding ways to optimize the personal growth and professional development of students in Higher Education Institutions (HEIs). Based on structural and organizational research, it has been proved that the traditional system of education in HEIs contributes to giving the students neither the right to active and creative educational activities nor the possibility of their full inclusion in social and professional life. Conducting the diagnostics of students' urgent psychological and pedagogical problems with the use of a created bank of techniques has identified various trends of change taking place in the educational environment of the higher education institution. The world experience of the conducted research of changes has shown that the reflexive approach has certain reserves in this regard. It therefore contributes to the formation of such information and educational environment (IEE), where all educational actors are aware of both professional and personal expediency of its components, defining and correcting the factors that inhibit or distort the achievement of the effectiveness and quality of the professional and personal development and the vital results of the student's personality taking into account both rigid and flexible feedbacks between the normative trajectory of academic achievement and the individual rates and directions of personal and professional development of a future specialist. Consequently, research-based recommendations have been developed at the methodological and practical levels for the teaching staff of the technical university. The findings of this study have revealed the significance of the main trends in the students' personal and professional development as a factor of influencing the optimization of educational outcomes for training future specialists in technical HEIs.

**Keywords:** synergetic educational environment, educational system, personal growth, professional development of future specialists, competence-based and reflexive approach, educational paradigm, professional mobility, planetary thinking, the principle of constructivism.

## 1. Introduction

Rapid change of information flows in the dynamically synergetic information and educational environment, integration and differentiation of scientific branches, the requirements of the labour market contributed to the formation of radically new research and practical problems in the educational system. Moreover, this system is considered as the product of forming and converting the image of the outside world into the individual's inner world as a professional subject, because the personality has a leading role in shaping the scientific and intellectual potential of the country.

The application of a new «cognitive-productive-resultative» educational paradigm, which should be in line with the innovative and perspective model of developing the society and the world as a whole based on the competency approach, has determined the transition from the process approach in organizing the professional training of future specialists of higher education institutions (HEI) to the productive one. Consequently, it contributed to the formation of new educational outcomes which are supposed to be the basis of the training objectives [1] related to providing the country with specialists adapted to the rapidly changing conditions of the labour market, who are able to competently, independently and responsibly solve multifunctional problems and ready for continuous profile growth, social and professional mobility [2-4].

In view of the above, not only the structure and content of productive and personal knowledge formed on the basis of a changing informational-educational environment, which contains both an open educational system as a whole and the subjects of this environment, are becoming important, but also the integrated ability to operate this knowledge, creatively act and optimally make decisions through the formation of planetary thinking as the ability to produce new knowledge, integrated skills and abilities under unpredictable conditions of the open informational space. This, in turn, enables a future specialist to effectively and adequately navigate in the current dynamic-synergetic information environment.

It is known that the traditional process-functional training in HEI, which tends to focus on the substantive training of the graduate, forms a process in which the activity-role components of the educational process reflect mainly one knowledge component of a future specialist's professional competency. Thus, it leads to creating so-called context-algorithmic world vision, rather than the informational-synergetic environment, which includes uncertain tasks, problems, hypotheses and changing axioms [5-7]. As a result of such training, the future professional virtually does not have problem-solving independence while forming new knowledge and skills, as well as the responsibility in the design-personal activity, which forms and systematizes the professional competency components. At the same time, one knows that students being a large social group of young people are distinguished in the society by some specific features caused by the turning point in their lives when the young person should make one of the most significant life choices – the professional one. Practice shows that an essential percentage of the student youth usually chooses a future profession owing to external motives which are not related to the content and peculiarities of their future professional activity. This situation is caused by the lack

of psychological support to students' personal and professional development processes, insufficient attention to intergroup relationships, as well as by ignorance of the students' characteristics in the learning process [8].

## **2. Theoretical Aspects of a Research**

Among the most urgent problems concerning the professional training of future specialists in technical higher educational institutions we have identified the following: student-age peculiarities (B. Ananiev, V. Romenets,); development of self-consciousness at the student-age (M. Borishevsky, V. Demchenko); student-age crises (E. Warban, T. Titarenko); peculiarities of students' adaptability to the new life conditions (O. Moroz, H. Dubchak, V. Semychenko); characteristics of students' personal development in the learning process (I. Kon, Hilbuh), the correlation between internal and external motivation for learning (A. Buhrimenko); factors affecting the quality of education (O. Rean, V. Yakunin, N. Davidiuk); psychological characteristics of student groups (M. Obozov, L. Marisova, I. Koval), leadership and conflicts in HEIs (V. Vinoslavskaya, G. Lozhkin). In foreign studies, the problems of student psychology have been developed in the following areas: the basic needs of the individual (A. Maslow), the motivation for achievements (G. Atkinson, M. Mayer, D. Mackland), behaviour styles in conflicts (R. Merton, D. Scott, K. Tomas), identity crises (E. Erickson), students' thinking trends (R. Burns, K. Grays), the influence of a personal profile on the success of the future professional activity (G. Kraig).

Conducting the studies of students' current psychological and pedagogical problems showed that in fact, the psychological (individual) constituent which leads, on the one hand, to the lack of a motivational component in obtaining high-quality education, and, on the other hand, to the non-emergence of synergetic-information world vision, was excluded from the student's learning activity of the modern educational system. This educational process, consequently, results in the problem-oriented and context-centred learning, but not forming professional subjectivity of a specialist, whose main characteristics are dynamism, independence, responsibility, success and ability to lifelong education.

At the same time, according to several researchers (O. Bodaliiov, A. Derkach, E. Zeyeyer, V. Slastenin, etc.) both during the learning process in HEI and in the process of effective professional activity there occurs updating, expansion and deepening of the structure and content of the specialist's professional competency, while the success of his further professional genesis depends on the personality development level and professional self-organization. Therefore, in our view, the subjective (personal) characteristics (psychological new formations, personal development) can perform the role of system-building conditions (criteria) for optimization of vocational training, since they are responsible primarily for successful updating of professional knowledge and skills, providing a harmonious professional development of the individual in the implementing the personal trajectory of successful training throughout life [5-7].

Based on the fact that the modern development model of the society and the world is generally oriented on rapid changes of information flows, accordingly, the life

cycle of knowledge, skills and abilities is significantly reduced. In addition, the modern function of knowledge, as a rule, is supposed to serve only certain aspects of being (as a means to achieve the stated goals), and the speed of knowledge development and its increasing number are not contributing to its qualitative assimilation in the educational process. Consequently, knowledge ceases to be a goal in education.

Proceeding from the principle of constructivism, whose essence is the understanding that knowledge is formed from own experience, and the learning results depend on personal understanding of the need for obtaining new productive knowledge, integrated and intellectual skills, it should be emphasized that the learning process in HEIs must become a personal creative process in which the structure and content of the future specialist's professional subjectivity are formed due to his own experience, and subjectivity development occurs only in the process of active interaction between all its subjects [9].

The aim of the study is to identify the main determinants of student activity, which will help identify key areas of external and internal psychological impact on the educational process of training future specialists. The object is the educational process in HEI. The subject of the research is the external and internal conditions and the determinants of the student's educational activity for the formation of a model of the personality-professional development of the subjects of the educational process of information-educational environment based on a reflexive approach.

According to formulated hypothesis of the study the effectiveness of personal growth and professional development of future specialists largely depends on identifying and overcoming of psychological factors that will negatively affect the educational process and will contribute to revealing the key directions of external psychological influence. Furthermore, the increase in students' psychological competency will serve the formation of their readiness for developing and implementing individual self-development programs in the unity and interaction of their personal and professional components.

Having defined the methodological basis of the study, we will consider the learning process of technical HEI as an open dynamic synergistic system, which is potentially analogous to the system of their future professional activity, but significantly differs from it by the content and organization forms. The basic conceptual view of the study will show that timely identification and students' awareness about the use of corrective measures in regard with factors that destructively affect the learning activity and students' professional development will contribute to combining the prospects of their personal and professional development, increasing the efficiency of learning and professional development.

Moreover, since the main mechanisms of development and the display of competencies, including cognitive (knowledgeable), operational-technological (abilities), motivational-ethical (values), social and behavioral components of readiness and professionalism during the professional training of a future specialist in HEI, are the components of educational and practical activity of the educational process subjects (as an objective-external form) and of thinking-development activity (as a subjective-internal form), then the effectiveness of forming a professional

subjectivity of the future specialist in higher educational institution should be based on the didactic modelling of the educational process. This term implies the system of purpose-oriented actions which reliably and validly are capable of ensuring the adequate assimilation of the simulated properties, connections and relations of the information-dynamic cognitive and transforming objects of natural and socio-cultural orientation, where the activity subject is the thinking activity of the future specialist' personality [10].

Considering the educational system of HEI as an integrative, personal and action-related one, which is guided by the basic laws of the existence and evolution of individual socio-technical systems and corresponds to the dependence of development and efficiency of functioning on the degree of its openness, the ratio of random and regular and domination of asymmetry as a condition of its stability, survival and evolution in general, the main outcome of the learning component of the educational system is the specialist's professional competency as an individual-psychological formation, which includes experience, values, knowledge, skills, psychological readiness for this kind of professional activity, readiness and ability to make decisions independently and responsibly in the course of professional activity. On the other hand, the definition of competence as a set of requirements prescribed by normative documents to the educational curriculum, that is, a set of knowledge, methods of activity, the range of powers, experience and personality qualities, allowed us to present it as a multidimensional vector of the educational process goal in the HEI [9].

It is obvious that any activity begins with the defining the subjective goal, understanding it as an expected activity outcome directed on the object through which the subject wants to satisfy one or another requirement [11]. This opinion is viewed as dominant when determining the goal of professional training in HEI by existing society. The goal consists in the formation of an intellectual and moral basis for the specialist's future successful work in the scientific, managerial and other industrial areas, management systems and work organizations in a market economy. It appears that for this reason the goal-competence, as a multidimensional vector, defining the organization of the learning process in HEI, is considered by us as an interrelated set of means of transferring some socio-historical experience to the subjects of the learning process, as well as a set of knowledge, skills, abilities, types and ways of activity formed by the social practice in standard ratios for specific historical conditions, thus forming the student's learning purpose as a systematic development of the personality's professional subjectivity, i.e. an appropriate competency vector.

Given that the goal-competence should refer to the future state of the object or system it is directed to, the purpose of specialist's professional training in technical HEIs will be considered as a spatial-temporal vector whose components, in general, are subject-specific, general-cognitive and educational goals-competencies. Their volume, on the one hand, lays normatively defined intellectual and moral foundations of the future professional in HEIs, and, on the other hand, forms the optimal conditions of socio-psychological elements of the educational process (needs, motives, goals, abilities, knowledge, skills).

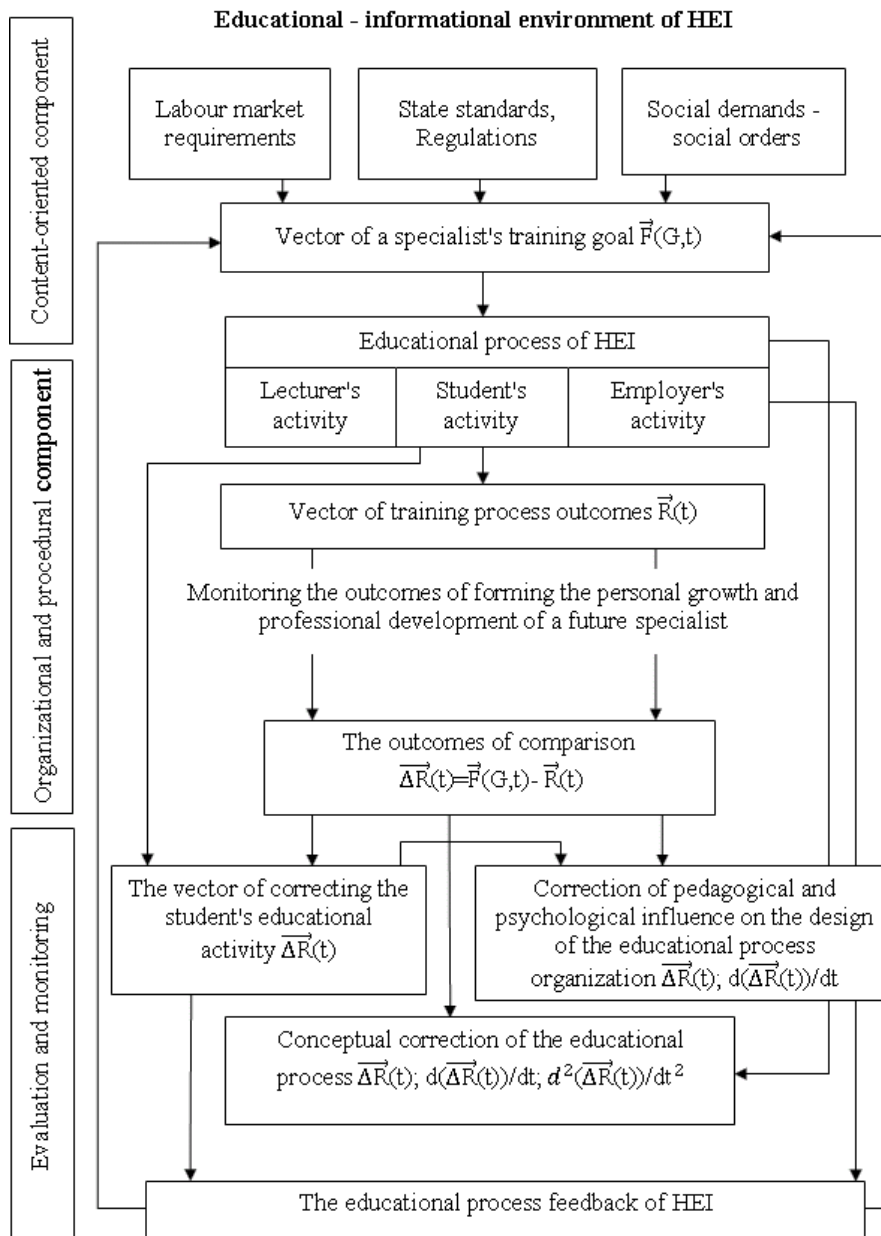
In this case, the conditions of optimality are viewed as quantitative and qualitative ratio of socio-psychological elements of educational activity, which allow the activity

subjects to carry out the process of transforming the personally-formed and productive knowledge interiorized during the learning process, including integrated skills and abilities, into psychic neoplasms, that is, the competencies of learning process subjects (experience, character traits, aspiration, abilities), provided that knowledge becomes personality's aspirations and beliefs, and the skills and abilities are brought to the mastery and professional capabilities [12-14].

At the same time, despite the multidimensional nature of scientific research devoted to the formation of personal growth and professional development of a future specialist [15-19], many challenges remain.

It is worth mentioning that the existence of contradictions between the need of creating a flexible pedagogical system for the continuous training of future specialists in the dynamically synergetic educational environment and the lack of active feedback links that are necessary for organizing the operative correction of the learning process [20-22], as well as between the need for monitoring, designing and predicting an effective educational process and outdated methods for evaluating productive knowledge and integrated skills (competencies) of future specialists [23, 24], allows considering the open educational system of HEI as a spatio-temporal model, which includes informational (knowledge, abilities, skills), developing (inclinations, capabilities) and educational (needs, motives, goals) components. Furthermore, the teaching and learning process can be regarded as one of the constituents in the modern educational and cognitive environment of HEI that should be performed according to a spiral-shaped curve in the coordinate system, which includes informational, developing and educational components, allowing us to formulate goals-competencies of educational systems of different levels depending on the relationships between subject-specific, general-cognitive and educational purposes [12-14].

According to the competency-based approach, we select the goal (competence) vector and the result (competency) vector as the system-building factors of forming the future specialist's professional competency components in HEI emphasizing the fact that, along with the forming the training objectives, it is also necessary to take into account the requirements of their measurement in terms of criteria of goals' ratio (competencies) and real outcomes of the educational process (competency). In this case, the peculiarities of the functional dependence  $\vec{R} = \vec{F}(G)$ , where  $\vec{R}$  is the result of the training process and  $\vec{F}(G)$  is the functional of the purpose of educational levels, are motivated by the presence of an individual (psychological) subsystem of the learning environment in HEI, which includes inclinations, abilities, needs, motives, goals concerning all subjects of the educational process. Below there is a theoretically generalized diagram of forming the personal growth and professional development of the future specialist in HEI, which includes content-oriented, organizational and procedural, as well as evaluation and monitoring components of the educational-informational environment of HEI (Fig. 1).



**Fig. 1.** Theoretically generalized diagram of forming the personal growth and professional development of a future specialist of the technical HEI

It is apparent from the theoretically generalized diagram below (Fig.1) that the speed of the permanent changes in the development of science, technology and social

relations, dynamic labour market needs require constant correction of planning and organization of the entire educational process. Due to continuous monitoring of the correspondence of the learning outcomes  $\vec{R}(t)$  to the given goals  $\vec{F}(G(t))$ , there is a need to update the rigid and flexible feedback, by means of which the influence on the process of forming the personal growth and professional development of the future specialists with the help of appropriate changes in degree programs is implemented. Let us prove this theoretically and test it in practice.

### **3. Practical implementation and Research Methods**

The following set of methods has been used to solve the problems of our study: a) theoretical (analysis, synthesis, modelling, generalization, system and problem methods) for conclusions and recommendations for identifying the key directions of external and internal psychological impact on the educational process of training future specialists; b) empirical (direct and indirect scientific observation, method of expert assessments, questioning) for the research process; c) pedagogical experiment (verification and formation of experiment) to confirm the effectiveness of the psychological impact on the educational training process in the formation of a personal trajectory of success; d) the methods of mathematical statistics for quantitative and qualitative data processing of the pedagogical experiment results.

The pedagogical experiment of the study was conducted in four stages: preparatory, ascertaining, formative, and final.

The Department of Pedagogy and Psychology of Professional Education of the Educational and Research Institute of Humanities and the Department of Military Training of the National Aviation University (NAU) were chosen to carry out an experimental study.

In total, 188 students, lecturers and specialists in the field of radio engineering and communications took part in various stages of the experiment.

At the preparatory stage (2013-2015), an analysis of educational and vocational curricula (EVC) and syllabus of educational process for training NAU graduates, who studied the special subjects of free choice, was carried out.

Courses in these disciplines were conducted in accordance with traditional forms and methods. The result of this process was the fragmental knowledge of students about their future profession, a decrease in intrinsic motivation to learn and ineffective use of skills in autonomous design activities.

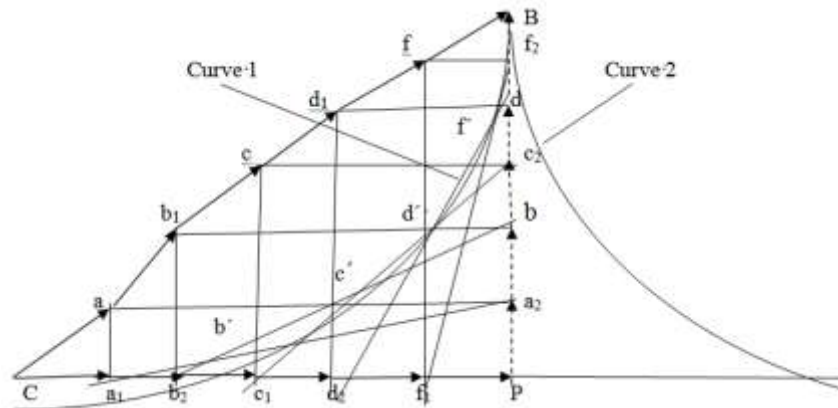
At the ascertaining stage of the experiment (2015-2016), the state of formation of professional competence of future communications engineers to the professional activity in the process of studying special disciplines was revealed. However, the results of questioning both lecturers and students showed an insufficient level of formation of the personal growth and professional development of future communications engineers; the low and basic level of professional competence among the overwhelming majority of respondents, which necessitated the holding of the third stage of the pedagogical experiment.

At the formative stage of the experiment (2016-2017), which was carried out in a real learning process, the corresponding organizational and pedagogical conditions



were reproduced (internal - positive motivation of students to the learning process and formation of professional value orientations; scientific and methodological support of the educational process by improving the qualifications of teaching scientific staff and cooperation with practitioners; integrated use of classical and innovative learning technologies in the process of studying special disciplines; systematic monitoring and adjusting the educational process on the basis of certain feedbacks; applying a system-synergetic approach to the organization of the educational process), the training and methodological support was developed, tested and implemented to assess the level of formation of the personal growth and professional development of future communications engineers.

Based on the foundations of personality development theory [5, 25], in our view, the most harmonious educational development of the individual can be represented as a curve 1 ( $Ca_1 b'c'd'f'B$ ) of the trajectory of successful educational activities, which is close or coincides with curve 2 of the individual development of a future specialist (Fig. 2). Let us prove it.



**Fig. 2.** Triangle of academic activity of a teacher and a student in the learning environment of the higher education institution

To construct a harmonious curve of student's personal growth and professional development (an individual trajectory of successful educational activity) (curve 1), one can use the triangle of academic activity CBP, whose CB side reflects the social influence on the personal formation of the future specialist (State standards and other normative documents in the field of education), CP side reflects the influence of the individual's component on the student's personal growth (forming the inclinations and abilities), and BP side reflects the influence of the educational component (forming the needs, motives, goals) of the student's personal growth for his successful professional and personal development (Fig. 2).

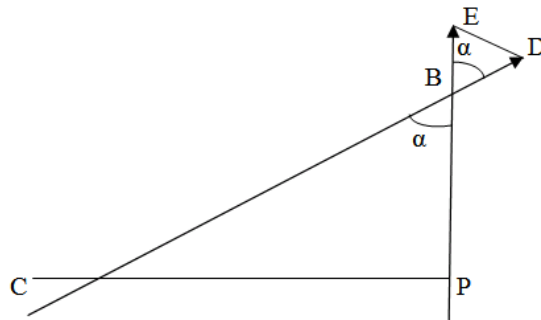
On the other hand, in the educational process of the higher educational institutions, the side CB of the triangle of educational activity CBP can be interpreted as a reflection of mastery (directing-intellectual activity) of the lecturer, that is, his information-knowledgeable component of pedagogical activity; the side CP – as the constructive and productive activity of the lecturer (the individual-advisory

component of pedagogical activity), and the side BP – as tutor-mentor activity of the teacher (motivational-value component of pedagogical activity).

The tangents to CB curve (curve 1), that is, segments  $a_1a_2$ ,  $b_2b$ ,  $c_1c_2$ ,  $d_2d$ ,  $f_1f_2$ , reflecting the dynamically synergetic process of students' growth and education, characterize his motivated-intellectual activity as a set of knowledge, educational and developmental components of learning activity; segments  $Pa_2$ ,  $a_2b$ ,  $bc_2$ ,  $c_2d$ ,  $df_2$ ,  $f_2B$ , reflecting the formation of the components of the student's psychic neoplasms, characterize the joint (educational) productive and creative activities of both the teacher and the student; segments  $Ca_1$ ,  $a_1b_2$ ,  $b_2c_1$ ,  $c_1d_2$ ,  $d_2f_1$ ,  $f_1P$ , forming the student's growth, reflect his productive abilities.

The components of CB line, i.e. the segments  $Ca$ ,  $ab_1$ ,  $b_1c$ ,  $cd_1$ ,  $d_1f$ ,  $fB$ , characterizing the teacher's professionalism, form, respectively, the scientific and pedagogical activity of the lecturer in the constructing the individual trajectory of successful student learning – the curve 1, and the segments of curve CB (curve 1), that is, the segments  $a_1b'$ ,  $b'c'$ ,  $c'd'$ ,  $d'f'$ , reflecting the effectiveness of the student's educational activity, determine the process of successful formation of his professional competency.

Let us present in Fig. 3 the correlation between the competency vector of the corresponding educational-professional level –  $\overline{PE}$  and the competency vector  $\overline{CD}$  of the specialist's training.



**Fig. 3.** Correlation between competency vector  $\overline{CD}$  and competency vector  $\overline{PE}$  of the corresponding educational-professional training level of a future specialist

The vector  $\overline{CD}$ , reflecting the existing social educational standards, represents the resulting (integrated) vector of competencies of the corresponding educational-professional training level.

Angle  $\alpha$  between vector  $\overline{CD}$  and vector  $\overline{PE}$ , which characterizes the mental development of the student formed in the educational process, that is, his competency, according to the theory of harmonious personality development [25], should be  $\alpha = 0.618$  radians. In this case, the so-called «gap» between vector  $\overline{PE}$  and  $\overline{CD}$ , that is, vector  $\overline{ED}$ , resulting from the correction of the educational process, determining the projection of vector  $\overline{PE}$  (competencies formed by the student) on the direction of the competency vector  $\overline{CD}$ , given by the state, informs us about insufficiently scientifically substantiated goals of training (subject-specific, general-cognitive,

educational). This, respectively, affects the structure and content of training, the complex of didactic technologies and diagnostic tools for the effectiveness of forming the future specialist's professional competencies by means of feedback links for adjusting the educational environment both in the short and long term, which are formed with the help of an individual trajectory of the student's successful learning activity (Figure 3).

Thus, the vector  $\overrightarrow{\Delta R}_i(t)$  (Figure 1) characterizes the hard feedback determined by the absolute value of the difference between the actual findings of monitoring the current success of a particular student and the trajectory of the strategy of forming the personal growth and professional development determined by normative documents, aimed at minimizing the value  $\overline{\Delta R}(t)$ . The disadvantages of this feedback are the impossibility of objectively assessing the control means and methods, as well as the short period of information obsolescence and weak prognostic capabilities [20].

The operative-prognostic feedback  $d(\overline{\Delta R}(t))/dt$ , as a flexible feedback of the first derivative of averaging the function  $\overline{\Delta R}(t)$  at a specific time point of the training period, allows predicting changes in the trajectory of the strategy of forming the student's personal growth and professional development.

Strategic-conceptual feedback  $d^2(\overline{\Delta R}(t))/dt^2$ , which takes into account the second derivative of the averaged function  $\overline{\Delta R}(t)$ , allows you to track changes in the educational and informational environment and make timely corrections in the educational paradigm.

The findings of the pedagogical experiment that took place in conditions of a real educational process with 52 third-year and fourth-year students (future communications engineers), on specialty «Telecommunications and Radio Electronics», showed that based on the introduction of innovative technologies in the experimental group (EG) while studying the integrated course of special disciplines the data of each experimental event were recorded by means of the corresponding system of evaluating the level of forming the personal growth and professional development of future communications engineers.

Data recording based on the results of control events and the outcomes of selected psychological and pedagogical techniques gave an opportunity to determine the levels of forming the personal growth and professional development of a future specialist adhering to the principles of objectivity in the assessments. The visual findings of the conducted pedagogical experiment are presented in Fig. 4.

The outcomes of the experiment showed an increase in the number of students with the productive (increased) and creative (high) levels in the experimental group (EG) after conducting the experiment and, correspondingly, the decrease in the number of students at the reproductive (basic) level. In the control group (CG), there was also a positive dynamics, but the rates are significantly inferior to the rates of students in the experimental group.

A visual comparison of the increase in the relative number of students in selected groups allows us to conclude that the greater slope of the first derivative from the function of the experimental trajectory of learning is in EG. At the same time, the presence of students with a low level of forming the personal growth and professional

development is explained, first of all, by the weak formation of orientational and value competency, that is, the desire to obtain only a diploma instead of education on specialty.

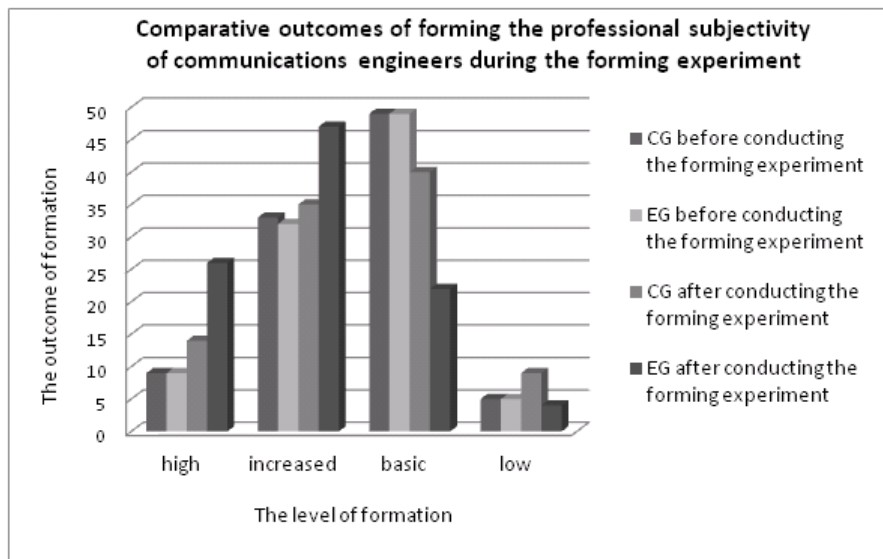


Fig. 4. Comparative outcomes of forming the personal growth and professional development of future communications engineers during the forming experiment

The connected vertices of diagrams at the stages of ascertain and forming experiment allow us to obtain a graphic function (the first derivative (tangent)), which characterizes a trajectory of training in both groups. Thus, by steepening of tangential graph growth on the diagram of high and increased levels and the reduction on the basic level, we get an idea of the effectiveness of forming the personal growth and professional development of a future specialist.

The findings of this study allowed us to formulate the algorithm of optimality (harmony) of person's growth and students' professional development in the process of professional training in technical HEIs, which consists of the following effective stages.

**Stage 1.** On the basis of the diagnostics of the student educational performance-vectors  $\vec{Ca}, \vec{Ca}_1, \vec{a}_1\vec{a}$  (Figure 2), we obtain the findings of the input level of his readiness for studying in HEI: the student virtually has no internal positive motive to studying (vector  $\vec{a}_1\vec{a}$ ); he has insufficiently developed learning ability (vector  $\vec{Ca}_1$ ); the fragmentation of the acquired knowledge, skills and abilities (vector  $\vec{Ca}$ ) for successful mastering of this educational level (tangent line  $a_1a_2$  to curve CB (curve 1)) is fixed.

**Stage 2.** As a result of the lecture's tutorial-constructive activity (vectors  $\vec{ab}_1; \vec{b}_1\vec{b}_2; \vec{b}_1\vec{b}$ ) the following process is performed: disclosure and development of the student's abilities (vector  $\vec{a}_1\vec{b}_2$ ); the formation of a positive internal motivation of the

student to studying (vector  $\overline{b_2b_1}$ ); the development of algorithmic ability to forming the productive knowledge, integrated skills and abilities (tangent line  $b_2b$  to curve CB (curve 1)).

**Stage 3.** The effectiveness of the context-designing and motivation-organizational activity of the teacher and the student (vectors  $\overline{bc_2}$ ;  $\overline{c_2c}$ ;  $\overline{c_1c}$ ) generates the result of forming the components of professional competency (independence, responsibility) by the student and professional subjectivity components of the future specialist in the higher educational institutions (tangent line  $c_1c_2$  to curve CB (curve 1)).

**Stage 4.** The broken line  $Ca_1cd_1fB$  (fig. 2), showing the growth of the informational-knowledge component of the student's educational process; line  $Ca_1b_2c_1d_2f_1P$ , representing the growth of the student's individual component (abilities) in the educational process; line  $Pa_2bc_2df_2B$ , reflecting the growth of internal positive motivation to learn; lines  $a_1a$ ;  $b_2b_1$ ;  $c_1c$ ;  $d_2d_1$ ;  $f_1f$ ,  $PB$ , presenting the formation of student's psychic neoplasms in the synergetic-dynamic learning process of development and education, connect the educational process of forming a professional subjectivity with the individual process of human development (curve 2).

The study of the modern educational environment in the higher educational institutions allows us to assert that the broken CB line can be regarded as a real information and knowledge component of the cognition process for forming the components of the student's professional competency; line CP reflects the direction of the process of forming the student's productive abilities to achieve the compliance with the given educational level, while the BP line, implementing the process of transition of external motivation into internal-positive motivation in respect of the educational process, characterizes the effectiveness of the process of forming the student's integrated psychological neoplasms as necessary and sufficient conditions for achieving success in life.

#### 4. Conclusions

Summarizing the material presented, it is evident that the most destructive and threatening factors for the higher education are the lack of understanding the need for educational reform in the innovation processes; psychological support for the processes of students' personal and professional development; considering the individual component of the educational process subjects.

The consideration of personal characteristics of the educational process subjects as system-forming conditions (criteria) for optimizing the vocational training will contribute to the effective personal professional development when implementing the personal trajectory of successful lifelong learning.

The effectiveness of forming the future specialist's professional subjectivity should be based on the plane of didactic modelling capable of ensuring an adequate assimilation of simulated properties, connections and relations of information-didactic cognitive and transformative objects of the natural and socio-cultural direction, where the activity subject is the thinking activity of the future specialist's personality, forming knowledge as individual inclination and persuasion, bringing skills and abilities to mastery and professional capabilities.

The systematic monitoring and correction of the educational process based on certain feedback correlations allow for the implementation of an individualized approach to learning and the possibility of systematically correcting the educational process in the HEI.

## References

1. Luhovi V. I., Sliusarenko O. M. Application of the Synergistic Approach to Defining the Competencies as the Basis of Qualification. *Vyshcha osvita Ukrainy: teoretychnyi ta nakovo-praktychnyi chasopys* [Higher Education in Ukraine: Theoretical and Scientific Journal], 2010, no. 1, pp. 151–159. (In Ukrainian).
2. Hura O. I. Criteria and Levels of Professional Training Efficiency of a Future Specialist at a Higher Education Institution. *Vyshcha osvita Ukrainy: teoretychnyi ta nakovo-praktychnyi chasopys* [Higher Education in Ukraine: Theoretical and Scientific Journal], 2010, no. 1, pp. 39–45. (In Ukrainian).
3. Akareem, H. S. & Hossain, S. S. (2016). Determinants of education quality: what makes students' perception different? *Open Review of Educational Research*, 3(1), 52–67. doi:10.1080/23265507.2016.1155167
4. Lizzio A., Wilson K., Simons R. University students' perceptions of the learning environment and academic outcomes: Implications for theory and practice. *Studies in Higher Education*, 2002, no. 27(1), pp. 27–52. doi: 10.1080/03075070120099359
5. Hamidi, Farideh; Meshkat, Maryam; Rezaee, Maryam; Jafari, Mehdi (2011). "Information technology in education". *Procedia Computer Science*. 3: pp. 369–373.
6. Luzik E. V., Khomenko-Semenova L. O., Kokareva A. M., Hurska O. O. University Education Innovative Models in Ukraine: Foreign Experience. *Visnyk Natsionalnoho aviatsiinoho universytetu. Serii: Pedagogika. Psykholohiia* [Proceedings of the National Aviation University. Series: Pedagogy. Psychology], 2018, no.13(2), pp. 19 - 26. doi:10.18372/2411-264X.13.13399
7. Braun D., Benninghoff M., Ramuz R., Gorga A. Interdependency management in universities: a case study. *Studies in Higher Education*, 2014, no. 40(10), pp. 1829–1843. doi:10.1080/03075079.2014.914913
8. Semychenko V. A., Dykan V. S. Reflexive Approach in the Theory and Practice of Higher Education. *Pisliadyplomna osvita v Ukraini* [Postgraduate Education in Ukraine], 2008, no. 1, pp. 78–85. (In Ukrainian).
9. Aristova N. I. Theoretical and methodical foundations of forming a professional subjectivity of future philologists, Doctoral thesis. National Aviation University, 2017, 659 P. Available at: <http://er.nau.edu.ua/handle/NAU/17440> (accessed: 29 July 2019).
10. Luzik E. V., Yevtukh M. B. System Simulation of Professional Training Process of Future Practical Psychologists at the Aviation University. *Visnyk Natsionalnoho aviatsiinoho universytetu. Serii: Pedagogika. Psykholohiia* [Proceedings of the National Aviation University. Series: Pedagogy. Psychology], 2015, no. 1(6), pp. 88-93. (In Ukrainian). doi: 10.18372/2411-264X.6.10196.
11. Kozakov V. A. Students' Self-Study and its information and methodological support. Kyiv, Higher School, 1990, p. 248. (in Russian)
12. Luzik E. V. Innovative Technologies in the System of Information Technology Higher Education, Proc. 5th Annu. Conf. Topical Issues of Higher Professional Education, 2017, pp. 94-96. (in Ukrainian).

13. Luzik E. V., Dybkova L. M., Kokareva A. M., Khomenko-Semenova L. O. Innovative Strategies of the Educational Process: Global Experience. *Visnyk Natsionalnoho aviatsiinoho universytetu. Serii: Pedagogika. Psykholohiia* [Proceedings of the National Aviation University. Series: Pedagogy. Psychology], 2019, no. 14 (1), pp. 64 - 70. (in Ukrainian). doi:10.18372/2411-264X.14.13742
14. Luzik E. V., Khomenko-Semenova L. O. Innovative Development of Higher Technical Education in Ukraine as the Basis for the Formation of the Planetary Thinking of a Future Specialist. *Visnyk Natsionalnoho aviatsiinoho universytetu. Serii: Pedagogika. Psykholohiia* [Proceedings of the National Aviation University. Series: Pedagogy. Psychology], 2018, no. 12 (1), pp. 73 - 80. (in Ukrainian). doi:10.18372/2411-264X.12.12905
15. Ogle D. The K-W-L: A Teaching Model that Develops Active Reading of Expository Text. *The Reading Teacher*, 1986, no. 39, pp. 564-576.
16. Joyce B., Weil M. *Models of Teaching*. Pearson Education Dorling Kindersley: London, England, U.K., 2015.
17. Wallace M. J. *Training Foreign Language Teachers: A Reflective Approach*. Cambridge University Press: Cambridge, England, U.K., 1991.
18. Marzano R. J., Pickering D.J., Arredondo D.E., Blackburn G. J., Brandt R.S., Moffett C.A. *Dimensions of Learning Teacher's Manual*. Association for Supervision and Curriculum Development, Alexandria, VA., USA, 1992.
19. Marginson S. Higher Education in the Global Knowledge Economy. *Procedia - Social and Behavioral Sciences*, 2010, no. 2(5), pp. 6962–6980. doi: 10.1016/j.sbspro.2010.05.049
20. Chupakhin S. A. The Role of Feedback in the Process of Forming the Professional Competence of Communications Engineers. *Scientific Letters of Academic Society of Michal Baludansky*, 2015, no. 3(2), pp. 60-63, 2015. (In Ukrainian). ISSN: 1338-9432.
21. Rakhmanov V. O., Alpatova O. V. Designing the Content of Academic Disciplines for Training Future Engineers in the Educational Information Environment of a Technical University. *Visnyk Natsionalnoho aviatsiinoho universytetu. Serii: Pedagogika. Psykholohiia* [Proceedings of the National Aviation University. Series: Pedagogy. Psychology], 2017, no. 10(1), pp.113 - 118. (in Ukrainian). doi: 10.18372/2411-264X.10.12517
22. Richardson, J. T. E. Instruments for obtaining student feedback: a review of the literature. *Assessment and Evaluation in Higher Education*, 2005, no. 30(4), pp. 387–415. doi: 10.1080/02602930500099193
23. Elliot J. Developing Hypotheses about Classrooms from Teachers' Personal Constructs. *Interchange*, 1977, no. 7, pp. 1-22.
24. Brennan J., Teichler U. The future of higher education and of higher education research. *Higher Education*, 2008, no. 56(3), pp. 259–264. DOI: 10.1007/s10734-008-9124-6
25. Luzik E. V. *Theory and Methodology of General Science Training in Engineering Higher Education*, Doctoral thesis, Institute of Higher Education of the Academy of Pedagogical Sciences of Ukraine, 1996, 650 p.