

Student – Training Environment Interaction: Soft Skills Development within E-learning

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Abstract

The paper is intended to provide an insight into the practice of soft skills development in the process of students' interaction with e-learning environment. The discussion calls upon the subject developers for a review of both the strategies of soft skills selection and the principles of transforming training courses into e-format. The paper is structured as follows: first, it reveals the ways of selecting a balanced optimal set of the university graduate' soft skills on the basis of meta-level typology and individualization. Second, it identifies the principles of organizing efficient training activities aimed at the soft skills development that is based on modelling the existential (real life) situation of self-development. Third, it presents an example of the efficient training course transformation into e-learning format without losing its developmental capacity. It is worth noting that this paper provides an important source of information and creative ideas for e-learning courses aimed at soft skills development.

Keywords ¹

soft skills, university Graduate Profile, e-learning, student-training environment interaction, developmental capacity.

1. Introduction

The new normal caused by COVID-19 pandemic and student-centered paradigm of education requires a revision of the traditional higher education basics. The system-forming factor is the student as a holistic living system, which is self-developing and includes cognitive, communicative and regulatory functions. Traditional mainly cognitive goals were supplemented by the practical goals of soft skills development as important components of professional, social and existential competencies. Achieving this goal through the student-training environment interaction has gained additional capacity due to the unprecedented development of digital technologies. Modern challenges as well as technological opportunities have required multidisciplinary solutions. Solving a whole chain of interrelated problems has necessitated a system approach to ensuring efficient student interaction with the e-environment, which acquired additional developmental capacity through technology.

The objective of this paper is to reveal the principles of student's interaction with training environment, which provides the efficient development of professionally, socially and existentially significant soft skills within university e-training. The strategic aim allows highlighting three main tasks:

1. The identification of an optimal soft skills set, which satisfies professional, social and existential sense of students;
2. The elaboration of psychological and pedagogical principles for the efficient soft skills development under conditions of university e-training;

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3. The search for ways of organizing e-learning environment that ensures implementing the revealed principles of the efficient soft skills development under condition of university e-training.

2. Analysis of recent research and publications

Analysis of recent research and publications in the target area showed undesirable tendencies:

1. A preferential orientation to the broad demands of a modern rapidly changing dynamic society without taking into account the sense and specific patterns of personality development;
2. A significant bias towards speculative conclusions based on cases of individual experience without experimental verification of the conclusions reliability;
3. The loss of the developmental efficiency of training courses in the process of their transformation into the e-format.

An attempt to overcome the revealed negative trends and the search for solutions to multidisciplinary problems led to the need to determine the scientific area within which it is possible to solve the problems that have arisen in principle. Comparative analysis highlighted studies in the field of educational psychology that purposefully study the patterns of personality development in its integrity in the process of interaction with the e-training environment, which, in turn, involves the study of conditions that ensure high development efficiency with experimental verification of the results.

Solving the first problem to determine the optimal set of soft skills led to the analysis of research in the field of differential psychology [1]. The review provided a warning to refrain from the well-known error of the "bag of virtues" [2], which unfortunately could not be avoided by the developers of most research and educational programs. A valuable acquisition was the technique of constructing a personality profile based on the well-known questionnaires of Cattell [3] and Leary [4].

It gave rise to a productive idea of identifying a zone and a program of personal development by the technique of imposing profiles on each other: a real personality profile on an ideal one or on a curriculum and labor market profiles [5].

Another entry point to the problem was the analysis of the National Qualifications Framework - NQF [6] and a number of specialties standards, which, in fact, repeated the NQF. In parallel a survey of leading European and Ukrainian experts in the field of education and sustainable development was conducted within the framework of four European educational projects [7, 8, 9, 10].

The task of determining the principles of soft skills efficient development under condition of HEI modernization required analysis of a number of researches in the field of developmental psychology [11, 12, 13, 14]. The dynamism and the ambiguity of modern working and living conditions led to the re-orientation of the "ready-made knowledge" training to the "learning to learn" training that is based on metacognitive approach [15]. In terms of the personality development in its integrity a special interest was devoted to the researches investigating the development of social [16] and emotional [17] intelligence as well as psychosomatics [18].

The task of efficient training within technological environment required analysis of e-learning researches and new paradigm of teaching digital competences [19, 20, 21].

3. Research methods and methodology

To verify the results a psycho-pedagogical experiment was conducted under condition of real university e-training. Statistical data were processed on the bases of STATISTICA 10.0 and SPSS 17.0 packages. Diagnosis of the soft skills development level was carried out by application of original methods and measuring tools of Eco-Humanistic Technology of Self-Development (EHTSD) [22].

Four European projects served as the bases of the experimental study. The total number of test subjects - 500 students, graduate students and teachers aged 17 to 55.

Methodology is aimed at the development of student-centered training on the basis of scientific knowledge of the human integrity as a living self-developing system supporting cognitive, communicative and regulative functions. Study is based on the concept of soft skills formation within synergistic system of interconnected personality characteristics related to integral, cognitive, communicative, practical and developmental competences.

The type of skill determines the content of developmental activity as well as the tasks aimed at skill development. The formation of sustainable skills is based on eco-humanistic principles. It is modelled “existential circle of self-development” which includes the following stages:

1. Learning event;
2. Awareness of the personal sense of the event;
3. Assessment of one's own resources for the realization of personal sense;
4. Choice of strategy for the development of missing resources;
5. Implementation of developmental activities;
6. Repetition of successful actions, their automation and integration into internal re-sources;
7. Transition to a new round of development.

The process of soft skills development is based on the following psychological mechanisms:

1. The basic mechanism of synergistic interaction of internal and external activities (consciousness and behavior);
2. The motivational mechanism for balancing personal sense - individual resources - external conditions;
3. The optimization mechanism of the strategic orientation capacity.

All three mechanisms operate in inseparable unity, but for clarity of presentation we divide verbally what is not separated existentially. The first "Mechanism of internal and external activities unity" allows forming a stable skill purposefully through the developmental environment organization. Student as a subject of activity aimed at achieving the goal is forced to take into account both internal and external conditions of goal achievement. In the process of adjusting the activity to external and internal conditions she/he gradually forms and integrates the acquired skill into her/his internal resources as a condition for achieving future goals. The second "Balancing mechanism" allows grasping the sense and accepting the goal of skill development based on the natural human ambivalent pursuit of conservation and development that works on the principle of continuous feedback between senses-resources-conditions. The third "Mechanism of strategic orientation" serves to optimize the skills development by means of setting the final goal ahead. This allows organizing actions in the system where the result of the previous action becomes a means of next action realization.

The increase in the efficiency of soft skills formation and automation in the process of student interaction with the developmental environment is determined by the properties of this environment. An environment that models the existential conditions of soft skills development provides optimal conditions for development. Increasing developmental capacity of training environment is possible by means of digital technologies.

4. Research Results

4.1. Determination of the optimal set of soft skills

Research has shown that the main problem of educational programs is the redundancy of the set of competencies and the lack of real opportunities for their development in a particular person. Most often these sets are created intuitively on the bases of the experience of individual experts and employers as well as on the analysis of local labor market demands or by direct copying of the specialty standard, which is mainly based on the opinion of the same experts. As a result, in contrast to a fairly clear idea of the set of special competencies the so-called general competencies are listed randomly and are combined without any correlation with the type.

There was an attempt to identify a set of competences for the multidisciplinary international team within European projects devoted to the municipal and regional sustainable development. European and Ukrainian experts from 20 Universities identified their sets of competences that practically did not differ from each other. Correlation and Factor analyses helped to organize identified competences into symptom complexes that fully corresponded to the cognitive, communicative and regulative functions of consciousness. The results of that research helped to achieve high efficiency of the curricula developed within the projects. The dissemination and sustainability programs provided high efficiency of the training courses based on system approach to so-called meta-competences development.

At the same time, the National and European Qualifications Frameworks clearly divide competencies into cognitive, communicative, practical, developmental and integral. This typology

corresponds to the modern scientific approach to the integration of personality characteristics as meta-qualities that correspond to the cognitive, communicative and regulatory functions of consciousness.

The whole system is built on meta-senses that determine existential, social and professional efficiency. In the context of meta-sense, the meta-competencies development determines the success of cognitive (self-development), communicative (synergistic interaction) and regulatory (decision-making) activities. The interconnected system of meta-sense and meta-qualities allows optimizing development of student's personality in its integrity.

The advantage of the student's personality purposeful development in integrity is a significant increase in the development efficiency due to the synergistic effect. Within influence of meta-sense, the same meta-characteristic is developed in different situational contexts. On this basis the developmental capacity is increased. As the motivation increases the significance, intensity and repetition of actions is growing. Thus, they determine the efficiency of the soft skills formation and automation.

At the same time the study showed that typology and meta-level integration are not enough to determine the optimal set of soft skills. Since soft skills must be developed not in pure abstraction but in a real specialist and person with unique personal characteristics under specific conditions, the set of soft skills must be individualized.

Combining socially and individually demanded soft skills is possible with the help of "Techniques of competency profiles imposing". Imposing a real profile on the ideal one allows identifying area of individual development as well as creating an initial strategic orientation in the format of the individual program of development. In the light of modern educational trends such a profile should integrate professional, social and personal characteristics that simultaneously meet the individual needs of a particular student and are in demand by modern society and the labor market.

According to our version the ideal balanced profile of a modern university graduate reflects the professionally-socially-emotionally competent, efficient-moral-harmonious, thinking globally and acting locally agent of society sustainable development and the subject of self-development.

The profile includes optimal set of soft skills that are synergistically related but are divided into groups for presentation:

1. Soft skills of a professionally competent graduate assume the ability to make decisions, to solve problems; to correlate the activities content with the context of real world; to evaluate critically information, performance, capabilities and resources; to be devoted to the constant self-development.

2. Soft skills of a socially competent graduate presuppose a developed social intelligence that provides efficient interpersonal, intragroup and intergroup interaction at the communicative and behavioral level; the ability to express thoughts clearly and succinctly, to expose oneself adequately and to receive feedback; to behave convincingly and confidently; to communicate in a digital environment with different audiences through different media; to expand the social support network; to transform communication and conflict into a constructive direction.

3. Soft skills of an emotionally competent graduate assume a developed emotional intelligence, which provides: an empathic attitude to others; understanding oneself, emotional states of one's own and others; the role of emotions in the life and work success, as a condition for enjoying the process of work; the impact of emotional dynamics on the formation of creative and working climate, motivation, health, decision-making; ability to manage emotions and stress; to use emotions to achieve goals; to evoke the desired emotion and turn it off in time; to reveal emotions correctly and to direct them for improving productivity and morale climate; mastery of techniques to prevent procrastination, which undermines motivation, operability and efficiency; development of social emotions of compassion, gratitude and dignity.

4. Soft skills of the graduate, as an efficient person assume a proactive attitude to life; sense focus on achieving the concrete results; ability to set goals; to manage time; to assess adequately conditions, external and internal resources, including own experience and optimal ways to achieve them; to solve problems, including non-standard ones, which require flexibility and creativity; awareness of the need for continuous self-development as a condition of efficiency in a dynamic world that is changing; ability to choose adequate learning and self-development strategies.

5. Soft skills of the graduate, as a moral person assume the self-identity of a decent person; fidelity to the word, responsible attitude to actions; moral dimension in decision-making taking into account the interests of those who may be involved and hurt; respect for the personality; attitude to others as a goal, not as a way to achieve it.

6. Soft skills of the graduate, as a harmonious person assume the qualities of a happy person: naturalness, immediacy, passion for the world and gratitude for life, unity with nature, a healthy lifestyle; versatile intellectual, cultural, creative and physical development; common sense and sense of humor; a consistent combination of professional, public and private life.

7. Soft skills of the graduate, as a globally thinking citizen assume multicultural consciousness - ethical awareness of the citizen, both of their country and of the world; global worldview and thinking, providing: understanding global opportunities, achievements, trends; social and civic responsibility; personal involvement in solving global problems/crises; cross-cultural competence - a correct understanding of many perspectives and awareness of the value of differences; the ability to collaborate efficiently and adapt to work in different contexts.

8. Soft skills of the graduate, as a locally active citizen involve understanding the needs and conditions of local environment, the world best practices in solving such problems; purposeful actions in the interests of development of the nearest professional, social and educational environment on the basis of understanding its problems, conditions, opportunities; ability to set goals and determine development strategy; to involve like-minded people, stakeholders and volunteers; to form synergetic teams, to exercise shared leadership; to get sustainable results; to bring the case to an end.

9. Soft skills of the graduate, as an "agent of sustainable development" imply a focus on the synergistic development of society, in which professional - economic - social - environmental factors interact; understanding the basic principles, the best world experience, once own place in sustainable development; acquisition of the necessary competence; professional and civic actions for sustainable development.

Soft skills of the graduate, as a "subject of self-development" imply a focus on self-efficacy through cognitive, communicative and existential self-development, as a condition of survival, quality and sense of life; desire for self-improvement; intellectual interest; resilience and commitment to lifelong learning; understanding psychological mechanisms of self-development; personal self-awareness and reflection; awareness of once own strengths and areas of development; creativity, ingenuity. Thus, the optimization of a set of soft skills is possible on the basis of scientifically sound principles of their integration at the metalevels. These are cognitive, communicative, practical, developmental and integral metalevels, which fully correspond to the cognitive, communicative and regulatory functions of consciousness. Another way to optimize a set of soft skills can be its individualization, i.e., tuning to a real specialist and a person with unique personal characteristics under specific conditions. Such a set can be presented in the format of a Graduate Profile, which can be imposed on the student's Real Profile to determine zone and individualized program of development.

4.2. Organization of e-learning environment for developing soft skills

E-transformation of the "Personal efficiency course" requires the creation of an e-learning environment that would not lose but, on the contrary, enhance the developmental effect through digital technologies. Thus, it has to be a full-fledged digital learning environment. The structure of the learning environment differs in traditional, blended and online learning. The essence of the differences lies in the degree of independence of the student, whose role is gradually transferred to the subject of the study. The role of the teacher is also transformed into the role of tutor, whose functions are partially (blended learning) or fully (online learning) delegated to a computer program. The quality of training depends on the quality of the learning environment, i.e., on its developmental capacity.

Studies have shown that the creation of an efficient e-learning developmental environment is achieved by modelling the existential circle of self-development, which determines the gradual and optimal development of soft skills as real internal actions, when the result of the previous action becomes a means of the next action. Optimization is achieved through the initial focus on the final goal – the Graduate Profile. Awareness of actions is provided by the metacognitive orientation, which includes knowledge about oneself, about the process of cognition and about the subject. It allows self-management of the e-learning process and is formed as a result of answering 3 questions:

- "Where am I now?",
- "Where do I want to be?",
- "How do I get there?".

For getting answer to these questions:

- The Start Test identifies the gap between Individual and Course Profiles at the very beginning of training.

- An individual e-learning program is built on the basis of the identified gap.
- The introductory video lecture and e-course presentation announces the final goal and answers the question WHAT? WHY? HOW? Answering these questions, students get acquainted with the structure, content, methods, tools and specifics of the work.
- The work plan is presented in the form of questions or problems with the indication of the mode of their processing and slide numbers as sources of information in case of need in the course of work.
- To transfer the acquired knowledge into practice a generalization in the form of questions for self-control (key points for memorization) is made and an algorithm of work within the e-course is formulated in the final part of the introductory lecture.

All further activities are aimed at practice, which becomes a conscious process of optimal memory and thinking because the students' cognitive scheme and the neural network consequently are formed optimally without unnecessary objects and links. Practice in the mode of e-learning includes digital tasks that correspond to the stages of the existential circle of self-development. These tasks are set by the program and the performance results are processed by the program. Usually, the type of tasks is limited to operations of multiple choice, matching, selection, open answers if they are unambiguous or essay if answers are unpredictable (in this case self-assessment according to the given criteria is used).

It is possible to overcome these technical limitations of the tasks by combining operations or introducing formats whose structure compensates for the lack of operations. The main criterion when choosing operations and formats is the developmental effect of the actions. It is not difficult to digitize questionnaires, tests, tools and techniques, such as "Social support network", SMARTER, "JOHARY windows" etc., where you need a choice. But the tasks of reflection are more sophisticated.

For reflection it is proposed to personalize the acquired knowledge by their projecting on the real-life situation in the format of essay. "Individual diary" is another example of a tool for the development of reflection by summarizing the experience gained in a format that combines the tasks of multiple choice with the essay. The individual training program within the course is presented in the format of "Progress Bar" (PB) – a multifunctional tool that serves as a navigator and allows evaluating the results in the form of a graph of success and personal profile. The individual program is displayed in the format of task codes within the module and the topic with reference to the tests and color markers of the processing level and the types of tasks. Description of PB functions, structure, algorithm of actions is presented in the text and video format in the tutorial.

Self-management of online learning involves self-monitoring and self-assessment of success throughout the learning process. To do this a whole system has been developed. It includes:

- Individual learning success graph, which is built automatically on the bases of each task results calculated on the parameters of speed, completeness, accuracy and displayed in the individual training program in Progress Bar (PB);
 - Individual profile of progress to the final goal which is built automatically on the results of the e-course in accordance with its goals;
 - Self-assessment of productive activities in the format of evaluation matrices using the original method of "color palette" of assessment;
 - Operational self-monitoring of success (keys and samples of answers).
- To support online learning the Tutor System works. It includes:
- E-tutor – an online learning program on the platform;
 - Self-tutor – independent activity according to a given algorithm;
 - Personal-tutor – consulting teacher;
 - Expert-tutor – expert on request;
 - Social-tutor – partners on social networks to share experiences;
 - Partner-tutor – interaction with each other on forums and course events.

The feedback system works in five modes:

- Automatic – instruction letters, reminders, results of solving tasks and tests;
- Correspondence – communication with the tutor;
- MS Teams, Zoom, Google meet or Telegram – communication with the tutor;
- forums on the platform - exchange of views and assistance in quality control in the section "report a bug";
- FAQ on the platform – answers to the typical questions.

The course has friendly interface. A comfortable training environment is created. Each task is formulated so that students understand meaning of their actions, opportunities, resources and was able

to seek help in a timely manner for monitoring their progress constantly. Help can be obtained in the form of instructions and solution format or sample, up to a detailed description of actions in text and video formats. To determine the mode, duration and frequency of work, a table is given that allows calculating the individual weekly load. The speed of advancement is determined by success: each task is performed until the efficiency reaches the level of 0.7.

4.3. The results of the experiment

The results the psycho-pedagogical experiment have proved high efficiency of e-learning organized with the priority of the developmental capacity of training activities based on the psychological laws of soft skills development. It was measured the efficiency of soft skills development and growth of indicators (Δ) in the control (k) and experimental groups, which worked in traditional (e^1) and online (e^2) mode within "Personal Efficiency Course". Analysis of the results based on a comparison of starting (ES) and final (ER) level showed the development of:

- cognitive soft skills
 - $ER^k = 0,37$ ($ES^k = 0,49$, $\Delta = 0,12$) (1)
 - $ERe1 = 0,62$ ($ESe1 = 0,37$, $\Delta = 0,25$) (2)
 - $ERe2 = 0,79$ ($ESe2 = 0,37$, $\Delta = 0,42$) (3)
- communicative soft skills
 - $ERk = 0,37$ ($ESk = 0,38$, $\Delta = 0,01$) (4)
 - $ERe1 = 0,51$ ($ESe1 = 0,38$, $\Delta = 0,13$) (5)
 - $ERe2 = 0,65$ ($ESe2 = 0,39$, $\Delta = 0,26$) (6)
- practical soft skills
 - $ERk = 0,38$ ($ESk = 0,36$, $\Delta = 0,01$) (7)
 - $ERe1 = 0,53$ ($ESe1 = 0,38$, $\Delta = 0,14$) (8)
 - $ERe2 = 0,64$ ($ESe2 = 0,39$, $\Delta = 0,26$) (9)
- self-development soft skills
 - $ERk = 0,40$ ($ESk = 0,36$, $\Delta = 0,04$) (10)
 - $ERe1 = 0,62$ ($ESe1 = 0,37$, $\Delta = 0,25$) (11)
 - $ERe2 = 0,69$ ($ESe2 = 0,38$, $\Delta = 0,31$) (12)
- integral soft skills
 - $ERk = 0,41$ ($ESk = 0,38$, $\Delta = 0,03$) (13)
 - $ERe1 = 0,53$ ($ESe1 = 0,42$, $\Delta = 0,11$) (14)
 - $ERe2 = 0,65$ ($ESe2 = 0,42$, $\Delta = 0,23$) (15)

Thus, the characteristic features of the efficient e-course for the development of soft skills are:

1. An e-learning environment that simulates real conditions for self-development and provides a friendly interface;
2. Optimally organized educational activity with an initial focus on the ultimate goal in the form of the official profile of the graduate;
3. Individual "tuning" to the available experience, resources, conditions.

The scientific novelty of the study lies in the fact that it developed scientifically justified, measurable and experimentally verified principles of:

1. selecting a balanced optimal set of the university graduate' soft skills on the basis of meta-level typology and individualization;
2. organizing efficient training activities aimed at the soft skills development that is based on modelling the existential (real life) situation of self-development;
3. efficient training course transformation into e-learning format without losing its developmental capacity.

5. Concluding remarks

The main problem in the implementation of educational programs is the redundancy of a set of soft skills and the lack of real opportunities for their development in a particular person. Optimization of the set is possible on the basis of:

1. Soft skills integration at the cognitive, communicative, practical, developmental and integral metalevels corresponding to the cognitive, communicative and regulatory functions of consciousness;
2. Soft skills individualization by adjusting the set to the needs of a real person with unique personal characteristics in specific conditions.

In the context of learning a set of synergistically related soft skills can be presented in the format of a balanced Graduate Profile. It reflects the professionally-socially-emotionally competent, efficient-moral-harmonious, thinking globally and acting locally agent of society sustainable development and the subject of self-development. The Graduate Profile imposed on the student's Real Profile reflects the area and the program of individual development. In the process of student's interaction with the training environment the increase in the efficiency of soft skills formation and automation is due to the developmental capacity of the training environment.

Training environment that models the existential developmental circle provides optimal conditions for soft skills development. The circle includes the following stages:

1. Entering the learning event;
2. Awareness of the personal sense of the event;
3. Assessment of once own resources for the realization of personal sense;
4. Choice of strategy for the development of missing resources;
5. Implementation of developmental activities;
6. Successful actions repetition, automation and integration into internal re-sources;
7. The transition to a new round of development.

The developmental activity of the students is based on the following psychological mechanisms:

- The basic mechanism of synergistic interaction of internal and external activities (consciousness and behavior);
- Motivating mechanism for balancing personal senses - individual resources - external conditions;
- Optimizing mechanism of the capacity of the strategic orientation to the final goal.

Initial metacognitive and strategic orientation to the final goal make the process of soft skills development conscious, optimal and systematically organized. If the whole process is centered on student's meta-sense it is possible to obtain a synergistic effect. Soft skills are developed under sense orientation in different situational contexts. Increasing the developmental potential of the learning environment is possible due to the technological capacity of e-training. The highest level is achieved if e-training is focused on the developmental capacity of learning activities rather than on available technical capabilities. Technical limitations are removed by combining available operations or task formats with structure that compensates for the lack of operations.

The efficiency of soft skills formation within e-learning is provided due to:

1. Self-management, self-control and self-assessment;
2. Prompt and regular feedback;
3. Tutor system: expert-tutor, social-tutor, program-tutor, self-tutor, partner-tutor;
4. Fine individual adjustment;
5. The optimal number of repetitions of actions due to their transfer to everyday life for soft skills automation and integration into student's internal resources.

6. Prospects for research

As for the prospects for research in the development of soft skills within e-training, they are associated with the problem of multidisciplinary [23, 24]. Unfortunately, the majority of e-courses lose their developmental capacity in the process of digitalization due to the lack of competence of subject teachers in the IT field, and IT specialists in the subject field. At the same time, as a rule, both of them vaguely understand how to organize training activities and environment on the basis of psychological and pedagogical laws that provide a high developmental effect. Only multidisciplinary teams can do this. To ensure synergy of the competences of subject teachers, psychologists and IT specialists, there is an urgent need to develop mechanisms for multidisciplinary interaction [25] between them as e-courses developers under condition of e-training.

The challenging task is to identify the well-defined criteria for the synergistic integration of disciplines within curriculum. It is necessary to solve the following issues:

1. To identify a system-forming factor for discipline comparison;
2. To consider the discipline direct and indirect contribution for achieving the ultimate goal;

3. To measure the weight of the discipline for providing efficiency in the situation of selection.

The weight of a discipline reflects its efficiency. So, it is directly dependent on the methods of its teaching. In addition, it is possible to achieve a synergistic effect of the students' development on the bases of disciplines interaction. This will allow optimizing curricula to free up time for students' self-development. Multidisciplinary approach is prospective and inexhaustible as a source of research.

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