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CRITERIA, INDICATORS AND LEVELS OF THE READINESS OF TEACHERS OF NATURAL SPECIALTIES TO DEVELOP THE ENTREPRENEURSHIP COMPETENCE OF HIGH SCHOOL STUDENTS

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У статті визначено актуальність формування готовності вчителів природничих спеціальностей до розвитку підприємницької компетентності у системі післядипломної педагогічної освіти, що забезпечує вдосконалення освіти та професійної підготовки педагогів шляхом поглиблення, розширення та оновлення їх професійних знань, умінь та навичок відповідно до сучасних потреб та процесів реформування освітньої галузі. Проведено аналіз теоретичних поглядів науковців до визначення ключових понять: «підприємницька компетентність», «готовність», «критерії», «показники», «рівні готовності».

Поєднуючи проблемно-цільовий, системно-узагальнюючий методи і метод системно-структурного аналізу наукової літератури автором досягнуто мети та виокремлено критерії визначення готовності вчителів природничих спеціальностей до розвитку підприємницької компетентності старшокласників, що сформовано у системі післядипломної педагогічної освіти: мотиваційно-ціннісний, когнітивний, технологічний, особистісно-емоційний, поведінковий. У рамках виокремлених критеріїв встановлено відповідні показники, що їх характеризують та визначено на основі поєднання для кожного критерію методи та засоби діагностування: бесіда, спостереження, анкетування, аналіз, звіт, самозвіт, експертна оцінка та самоаналіз. Розроблена система критеріїв та показників дає можливість визначити рівні готовності вчителів природничих спеціальностей до розвитку підприємницької компетентності старшокласників: низький (репродуктивний), середній (репродуктивно-реконструктивний), достатній (реконструктивний) та високий (творчий).

Проаналізовані критерії, показники та рівні дають змогу визначити реалії та передбачити динаміку формування готовності вчителів природничих спеціальностей до розвитку підприємницької компетентності старшокласників у системі післядипломної педагогічної освіти

Ключові слова: післядипломна педагогічна освіта, готовність, критерії, показники, рівні готовності, підприємницька компетентність

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1. Introduction

The implementation of a competency approach in the European educational space started at 2006, when a resonant document appeared [1], and eight key competences were identified in the strategy [2].

Such processes became an impetus for the reform of education in Ukraine, which is reflected in normative documents [3, 4] which clearly outline the new requirements for Ukrainian education of the 21st century, emphasize the formation of abilities, skills, and especially the development of competencies in education seekers. These documents identify eleven key competencies, including "entrepreneurship and financial literacy", which include: the ability to generate new ideas, initiative, willingness to take responsibility for their own decisions; the ability to organize their activities to achieve their goals; awareness of the ethical values of effective cooperation; readiness for the implementation of initiated ideas; making own decisions [3].

Therefore, it is urgent now to form the readiness of teachers of natural sciences to develop the entrepreneurial competence of high school students, which we must prepare before deciding to build an individual tra-

jectory of their development. To address these challenges, high expectations are placed on postgraduate education institutions that provide advanced education and training for educators by deepening, expanding and updating their professional knowledge, skills and abilities in accordance with current needs and processes of the educational reform.

2. Literary review

Various aspects of teacher training were explored in works by both domestic and foreign scholars, in particular:

– theoretical substantiation of psychological and pedagogical principles of specialists' preparation for communicative and innovative activity [5, 6];

– implementation of innovations in education, including in vocational education [7, 8];

– formation of the professional competence of teachers of natural sciences [9, 10].

The concept of "readiness" is the most controversial in modern pedagogical science. From the middle of the twentieth century the concept of "readiness" has been interpreted as the ability of a person to self-regulate

his/her own behavior. We see a modern interpretation of this term in psycho-pedagogical research, and we are talking about the unity, stability and stability of psycho-pedagogical influences [11].

However, the definition and interpretation of the notion of “the readiness of natural science teachers to develop the entrepreneurial competence in high school students” (hereinafter referred to as GVPSdRPKS), which is one of the challenges of the modern reform, has not been sufficiently considered in scientific works. In the course of the conducted researches, the definition of GVPSdRPKS - the ability of teachers to effectively carry out their professional activity, possessing a holistic system of knowledge, abilities and skills for the development of the entrepreneurial competence was elaborated.

3. Purpose and objectives of the research

The purpose of the article is to determine the criteria, indicators and levels of the readiness of teachers of natural sciences to develop the entrepreneurial competence of high school students, formed in the system of postgraduate teacher education.

To ensure the achievement of this goal, the following tasks were set:

1. to identify a system of criteria for determining the readiness of natural science teachers to develop the entrepreneurial competence of high school students;
2. to establish indicators, characterizing the criteria and to determine methods and means of diagnosing GVPSdRPKS;
3. to develop the levels of preparedness of teachers of natural sciences to develop the entrepreneurial competence of high school students.

4. Determining the readiness of natural science teachers to develop the entrepreneurial competence of high school students

The readiness of natural science teachers to develop the entrepreneurial competencies of high school students is determined by certain criteria and indicators, by which their level of readiness can be analyzed. Criteria development is one of the most complex and unprocessed theoretical problems. In the pedagogical literature, the concept of "criterion" is characterized as a means, by which alternatives are measured or selected, or, in other words, "criterion" is an objective feature, on the basis of which a comparative assessment or classification of the pedagogical processes and facts under study is made.

The notion of "criterion" is defined as a means of reasoning, a sign, on the basis of which the definition or classification of something is the measure of evaluation [12]. The term "criterion" comes from the Greek criterion – "a measure for evaluating something."

In general, criterion is an important and defining system trait that characterizes the various qualitative aspects of the phenomenon under study, and in our case – the readiness of teachers of natural specialties to develop the entrepreneurial competence of high school students, provided through the system of postgraduate pedagogical

education, helps to clarify its essence, helps to clarify its essence, to specify the main images and objectively evaluate them in a certain dynamics. In this connection, in our study we will use the term "criterion" as a benchmark and indicator, on the basis of which we diagnose the state of the readiness of teachers of natural sciences to develop the entrepreneurial competence of high school students in the system of postgraduate pedagogical education.

As a whole, criteria should reflect the main aspects of the functioning of the object under study – the readiness of natural science teachers to develop the entrepreneurial competence of high school students in the postgraduate education system and are revealed through a number of indicators, depending on the manifestation of which, there can be concluded more or less.

The term "indicator" is interpreted as: "evidence, sign of anything; visual data about the results of some work, some process; achievement data in anything; data that indicates the amount of something"[13].

We believe that the concept of a criterion is broader than an indicator, and therefore a situation is possible, where a whole system of indicators exists under one criterion.

Determination of the state of GVPSdRPKS in the system of postgraduate pedagogical education was carried out according to the criteria: motivational-value, cognitive, technological, personality-emotional, behavioral (Fig. 1).

The motivational value criterion is the basis for the professional competence formation. In order to ensure the

provision of vocational education and training, they must have: professional and pedagogical motives: the desire of professional training of teachers of natural specialties for the development of entrepreneurial competences of high school students through the system of postgraduate pedagogical education; cognitive motives: the desire to acquire new knowledge, skills and competencies in the field of entrepreneurial competences, integrating formal, non-formal and informal education; methodological motives: the desire to master innovative approaches, methods, development technologies of the entrepreneurial competence; social motives: the desire to professionally grow and enhance one's image and social status.

For teachers of natural sciences, the major motivational value criterion is determined by the indicators:

- professional interests: interest in innovative processes in education and modern approaches to the entrepreneurial competence development;
- professional needs: the need to acquire new knowledge, skills and competences to organize the educational process on a competent basis, the need for continuous professional growth through the system of postgraduate pedagogical education;
- professional motives: development of professional skills and improvement of a social status in society;
- professional values: responsibility for preparing the younger generation for independent living, constant support and example.

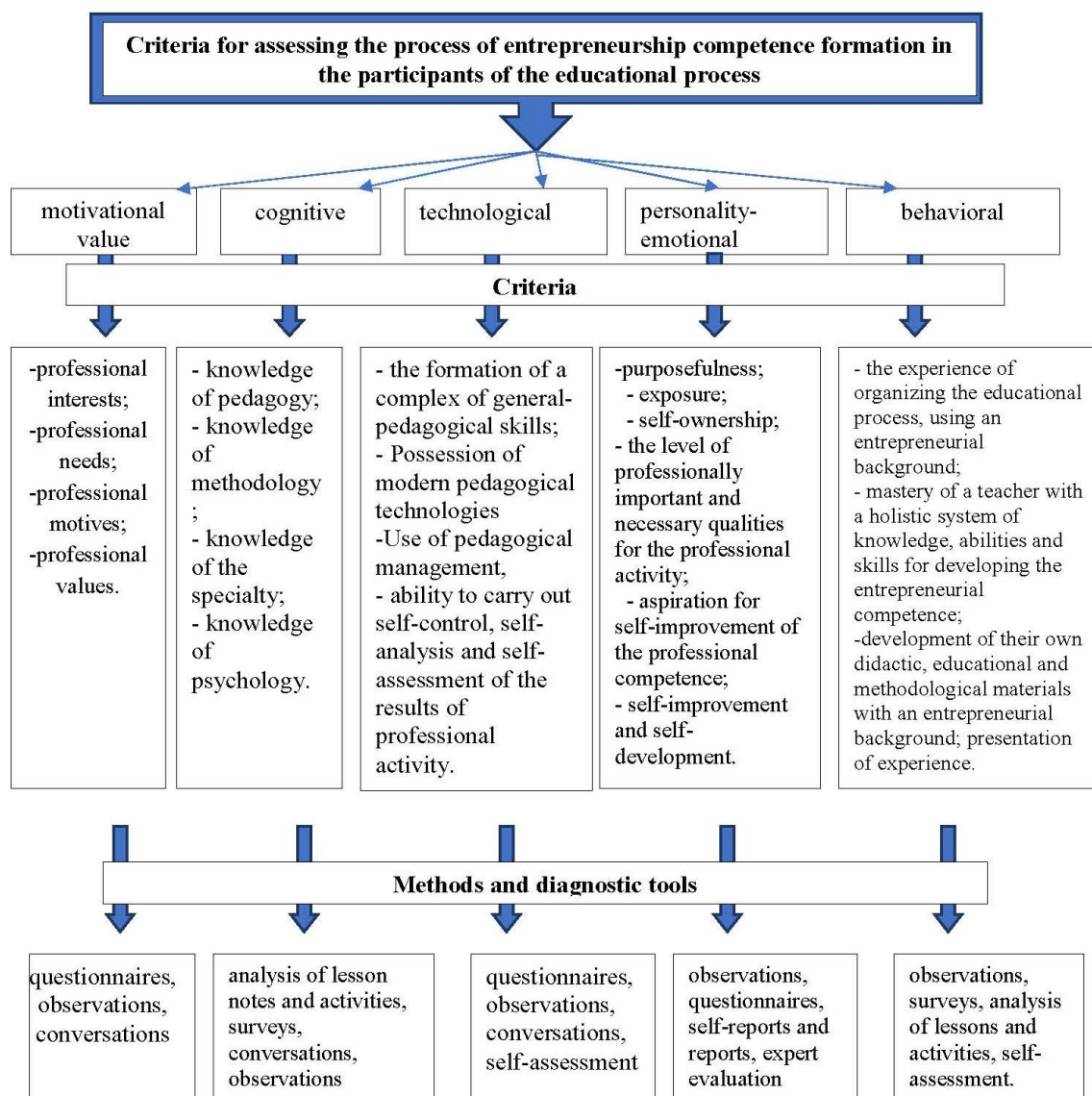


Fig. 1. Criteria, indicators and diagnostics of the readiness of natural science teachers to develop the entrepreneurial competence of high school students

The diagnosis of the motivational value criterion of GVPSdRPKS was carried out by methods of questioning, observation, conversation.

The cognitive criterion determines the totality of knowledge regarding the introduction of understanding of the essence, content, goals and objectives of the teacher's professional activity in the context of the educational reform; awareness and ownership of methods and ways of developing the entrepreneurial competence; the ability to reproduce, synthesize and apply the knowledge and skills, acquired in the postgraduate education system to integrate entrepreneurial content into the educational process.

This criterion generates an understanding of the benefits of competency-based learning, aimed at preparing a competitive graduate, who will be able to flexibly approach different problems. Competent learning and developing the entrepreneurial competence is urgent.

Indicators of cognitive criteria are:

– knowledge of pedagogy: understanding of pedagogical views and approaches to the organization of

competent training and development of the entrepreneurial competence, scientific bases of the organization of pedagogical activity with an entrepreneurial background;

– knowledge of the methodology: methods and ways of organizing practical and theoretical activities of students in the development of the entrepreneurial competence;

– knowledge of the specialty: content of the subject, entrepreneurial background in the subject;

– knowledge of psychology: age peculiarities of applicants for education, formation of an individual educational trajectory of personality development.

The cognitive criterion of GVPSdRPKS in the system of postgraduate pedagogical education is determined on the basis of the analysis of a synopsis of lessons and educational activities, observation, interview, conversations.

The technological criterion implies the formation of abilities and skills of professional activity of teachers in the entrepreneurial competence development (ownership of technologies, methods and techniques); deter-

mines the ability of a natural science teacher to integrate entrepreneurial content into the teaching of the subject and the extracurricular activities; manifests itself in the ability to effectively solve professional problems and make decisions independently; ability to establish cooperation with all participants in the educational process.

Indicators of the technological criterion are:

- formation of a set of general pedagogical skills (prognostic, organizational, communicative, cognitive, reflexive);

- possession of modern pedagogical technologies and methods;

- use of methods of pedagogical management;

- the ability to exercise self-control, self-analysis and self-assessment of the results of professional activity.

The diagnostics of the GVPSdRPKS technological criterion was carried out by the methods of questioning, observation, conversation, self-assessment.

The personality-emotional criterion includes pedagogical abilities (didactic, organizational, communicative, reflexive, subject-practical, etc.), professional qualities (moral, emotional-volitional, individual-typological, personality-character), peculiarities of professional motives, attitudes, interests of teacher's professional activity, active-positive emotional attitude to professional activity).

Indicators of personality-emotional criteria are purposefulness; persistence; activity; initiative; self-possession in situations of uncertainty; the level of formation of qualities, professionally important and necessary for the performance of professional activities; pursuit of the professional competence; self-improvement and self-development, etc.

Means of diagnostics were observations, questionnaires, self-reports and reports of heads of educational institutions, expert evaluation.

The behavioral criterion determines the implementation of the skills, acquired in the system of postgraduate education by teachers of natural sciences, which ensure the development of the entrepreneurial competence of high school students; development of own pedagogical experience of using entrepreneurial content; continuous analysis, self-assessment of knowledge, skills and entrepreneurial competence, acquired in the system of postgraduate pedagogical education; development of synopsis of lessons, scenarios of extracurricular and methodical measures with entrepreneurial content; exchange of experience and dissemination of their own didactic, educational and methodical experience.

The behavioral criterion includes indicators: having experience in organizing the educational process with the use of the entrepreneurial background; developed own didactic, educational-methodical materials with the entrepreneurial background; presentation of experience of the entrepreneurial competence development at conferences, seminars, periodical professional press, etc.

The means of diagnosing behavioral criteria are observation, questioning, self-assessment, analysis of lessons and activities.

5. Results of the study and their discussion

Based on the defined criteria and indicators, it is possible to judge GVDPdRPKS. This system of criteria and indicators is the basis for determining the major lev-

els of preparedness of natural science teachers to develop the entrepreneurial competence of high school students.

Under the level of teachers' readiness for the development of the entrepreneurial competence of high school students we understand the gradation of the measurement of natural knowledge, abilities and skills of the entrepreneurial competence, acquired by teachers through the system of postgraduate pedagogical education, identification of their internal motivation, steady awareness of the profession, which provides clear accounting for the criteria and indicators highlighted.

Taking into account the abovementioned measures, we have distinguished four levels of forming the readiness of natural science teachers to develop the entrepreneurial competence of high school students:

- **low (reproductive)**: low or no understanding of the entrepreneurial competence; lack of awareness of the need to develop the entrepreneurial competence of high school students, lack of initiative to increase their professional level in the system of postgraduate pedagogical education through non-formal and informal education, passivity in formal education; there is only an external motivation;

- **medium (reproductive and reconstructive)**: the desire to develop the entrepreneurial competence is unstable; lack of awareness of the role of the entrepreneurial competence in future professional activity, the average level of development of the motivational sphere; average level of knowledge, abilities and skills in the development of entrepreneurial competence; ability to independently form an individual educational trajectory in the system of postgraduate education, fragmentary demonstration of initiative in formal education; passive participation in non-formal education activities with chaotically organized self-educational activities;

- **sufficient (reconstructive)**: positive attitude to the development of the entrepreneurial competence of high school students, awareness of its importance in future professional activity; a sufficient level of knowledge, skills and abilities to entrepreneurship; the ability to make decisions on the introduction of entrepreneurial content in teaching activities; periodic manifestation of independence and lack of initiative in the course of professional development through the use of various forms of education: formal, non-formal, informal; sufficient development of the motivational sphere; demonstration of practical skills of introducing entrepreneurial content into the educational process;

- **high (creative)**: expressed willingness to develop the entrepreneurial competence of high school students; formation of knowledge, skills and entrepreneurial competence; ability to creatively approach the modeling of the educational process with the use of entrepreneurial content; active practice of applying active teaching methods in their professional activity; availability of own experience of the entrepreneurial competence development and ability to independently and effectively build an individual educational trajectory in the system of postgraduate education; high motivation and striving for future professional activity, striving for professional growth.

6. Conclusions

1. To determine the readiness of teachers of natural science specialties for the development of the entre-

preneurial competence of high school students, which is formed in the system of postgraduate pedagogical education, the criteria are distinguished: motivational-value, cognitive, technological, personality-emotional, behavioral; appropriate indicators that characterize them are established and the methods and means of diagnosis for each criterion on a combination basis are determined.

2. The developed system of criteria and indicators makes it possible to determine the levels of readiness of teachers of natural sciences to develop the en-

trepreneurial competence of high school students: low (reproductive), medium (reproductive-reconstructive), sufficient (reconstructive) and high (creative).

Thus, the use of the set of criteria and indicators will allow a comprehensive assessment of the realities and to predict the formation dynamics of the readiness of teachers of natural specialties to develop the entrepreneurial competence of high school students in the system of postgraduate teacher education.

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