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DIAGNOSIS WITH THE HACKATHON ECOSYSTEM OF THE UNIVERSITY OF THE READINESS OF STUDENTS FOR RESEARCH ACTIVITIES

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BACKGROUND AND OBJECTIVES.

The changes in society associated with the country's transition to an innovative way of development radically change the nature and goals of labor activity. Profession under such conditions is considered by a person as a source of material well-being and gaining the desired social status. Professional self-determination occurs too late or is realized as forced, so the lack of opportunity to realize one's professional preferences has a negative impact on the individual and on society as a whole. As a result, in recent decades there has been a significant increase in the requirements of modern employers to the professional training of graduates of educational institutions. A young specialist must improve in the profession, be ready to change professional activity, i.e. be socially and professionally mobile, scientifically established, which can be realized with the help of Hackathon-ecosystem.

METHODS. Collection of information, survey of students and teachers were carried out using a systematic approach on the basis of the Hackathon ecosystem. Processing of the obtained information, definition of scientific statements, generation of conclusions and practical

recommendations were carried out with the help of the software product "Methodology of studying students' adaptation to dual education in higher education".

FINDINGS. It is proved that the research activity of students is a necessary condition for their professional self-determination, acts as part of a holistic, long-term, dynamic process of entry into the profession and as a result of the choice and design of their future professional activity. Students' involvement in research activity largely determines the effectiveness of their social and professional development.

CONCLUSION. Research activity of university students is an effective means of forming knowledge, abilities and skills necessary for personal and professional self-determination. It not only stimulates and motivates personal and intellectual development, contributes to the continuation of education, proves the degree of its readiness and acts as one of the guarantors of the success of the process of professional self-determination in general.

KEYWORDS: Hackathon ecosystem; research readiness; students; technical university.

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ДІАГНОСТИКА ЗА ДОПОМОГОЮ ХАКАТОН-ЕКОСИСТЕМИ УНІВЕРСИТЕТУ ГОТОВНОСТІ СТУДЕНТСЬКОЇ МОЛОДІ ДО НАУКОВО-ДОСЛІДНОЇ ДІЯЛЬНОСТІ

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ПОСТАНОВКА ПРОБЛЕМИ ТА ЗАВДАННЯ. Зміни у суспільстві, пов'язані з переходом країни на інноваційний шлях розвитку, кардинально змінюють характер та цілі трудової діяльності. Професія за таких умов розглядається людиною як джерело матеріального благополуччя та набуття бажаного соціального статусу. Професійне самовизначення відбувається занадто пізно чи усвідомлюється як вимушене, тому відсутність можливості реалізувати свої професійні уподобання негативно позначається на особистості та суспільстві в цілому. І як результат, останні десятиліття відзначається значне зростання вимог сучасного роботодавця до професійної підготовки випускника навчального закладу. Молодий фахівець повинен удосконалюватися у професії, бути готовим до зміни професійної діяльності, тобто бути соціально та професійно мобільним, що науково відбулося, що може бути реалізовано за допомогою Хакатон-екосистеми.

МЕТОДИ. Збирання інформації, опитування студентської молоді та викладачів здійснювалися з використанням системного підходу на базі Хакатон-екосистеми. Обробка отриманої інформації, визначення наукових положень, генерування висновків та практичних рекомендацій

здійснювалося за допомогою програмного продукту «Методологія вивчення адаптації студентів до дуальної освіти у вищій школі».

РЕЗУЛЬТАТИ. Доведено, що науково-дослідна діяльність студентської молоді є необхідною умовою їхнього професійного самовизначення, постає як частина цілісного, тривалого, динамічного процесу входження у професію та як результат вибору та проектування ними майбутньої професійної діяльності. Включеність студентів до дослідницької діяльності багато в чому визначає ефективність їх соціального та професійного становлення.

ВИСНОВКИ. Науково-дослідна діяльність студентської молоді вузу є ефективним засобом формування знань, умінь та навичок, необхідних для особистісного та професійного самовизначення. Вона не тільки стимулює та мотивує особистісний та інтелектуальний розвиток, сприяє продовженню освіти, доводить ступінь її готовності та виступає як один із гарантів успішності проходження процесу професійного самовизначення в цілому.

Ключові слова: Хакатон-екосистема; готовність до науково-дослідної діяльності; студентська молодь; технічний університет.

INTRODUCTION.

Intense processes taking place in the economic, political, and social spheres of modern Ukrainian society inevitably affect education. Higher professional school of Ukraine is undergoing a multi-vector process of renewal. One of the main goals of transformation is a comprehensive training of a specialist, capable of professional growth and self-development, who is ready to conduct scientific research in a particular field of knowledge.

It is not enough for a modern graduate just to have deep subject knowledge and possess practical abilities and skills. One of the actual directions of development of the educational process of higher education institution is the formation of students' readiness to research activities.

The analysis of the scientific literature shows that various aspects of the problem of students' readiness to research activities are considered by a number of teachers and researchers (Linnell et al., 2014). This problem is not new, but even today it does not lose its relevance and acuteness.

The problem of formation of students' readiness to research activities can be solved using different methodological approaches (modular, anthropocentric, differential, synergetic, culturological, etc.).

From our point of view, in the current socio-economic and political conditions of higher education development, the application of competency-based approach to solve this problem is the most effective and expedient.

The competence approach in determining the goals and content of education is not qualitatively new in the domestic system of education. I. Gryshchenko notes that the competence approach is "an approach that focuses on the result of education, and the result of education is not the amount of information learned, but the ability to act in various problem situations" (Gryshchenko, 2015).

In the draft of the new state standards of higher professional education the notion of "competence" was introduced as a more complete, personally and socially integrated result of specialists' training.

Following T. Zhurko, we consider competence as "a set of personal qualities (knowledge, abilities, skills, value and meaning orientations) which are conditioned by activity experience and provide efficiency of independent activity" and competence as "a form of presentation of normative requirements to the results of educational practice from the position of personal qualities of students" (Zhurko, 2016).

Comprehensive consideration of the issues raised in our study through the prism of competence approach implies consideration of such notions as "research activity of students", "research competence and competence".

Among the many interpretations of the concept "research activity of students" found in the scientific literature, the most accurate, in our opinion, is

the definition of J. Yao, H. Li, D. Shang, L. Ding, who understand this type of activity as "a type of creative, cognitive activity aimed at students' mastering of independent theoretical and experimental work, modern methods of scientific research, experimental techniques" (Yao et al., 2021).

Research activity of students, like any human activity, should be socially conditioned and significant, its content cannot be arbitrarily designed, invented. It must meet the socially recognized forms, methods and norms of scientific research.

A number of researchers note that the level of readiness of a university student to research activity can be considered as an objective indicator of his/her professional competitiveness. In particular, G. Yildizer considers professional competitiveness of students as "the ability to achieve success in professional activities under competitive conditions on the basis of professional competence and mobilization of the resource of individual-personal qualities" (Yildizer, 2017). Undoubtedly, a high level of students' readiness for research activities is an integral guarantee of their success in professional activities.

In agreement with V. Scherbak, S. Arabuli, research competence of students will be considered as "an integrative characteristic of a personality, interpreted as its property or quality, characterizing student's readiness to solve research problems by methods of scientific knowledge and expressed in the unity of value-motivational, cognitive and operational components of student's personality" (Scherbak and Arabuli, 2021).

In turn, research competence of students is considered "as a set of intellectual, personal and activity characteristics of the student, (N. Krakhmalova) implemented in the productive research activities" (Krakhmalova, 2021).

When describing activity competences (I. Goncharenko) uses the concept of "readiness" interpreted as "the actual and realizable ability to perform actions-operations of a certain kind" (Goncharenko, 2021).

P. Dudko considers the research work of student youth on the basis of innovative enterprises in the broad context of information space, where the activity itself acts as a process of student activity (Dudko, 2021).

P. Dudko singles out the following components of students' research work: informational (getting information about already existing knowledge, generalizing this knowledge, fixation); analytical-critical (analysis and criticism of existing knowledge, setting the research problem based on revealing partially or completely unidentified sides of research topic); research proper (conducting theoretical and experimental research to get new knowledge, fixation of intermediate research results); translational-ophobic (research on the subject).

Today a lot of attention is paid to the training of technical personnel. The country desperately lacks engineers, and those who are able and want to become

engineers need to be provided with decent training conditions. After all, in the conditions of market competition and modernization of the country the leading role in innovative development of Ukraine belongs to science-intensive and high-tech industries. A modern engineer should combine the talents of a scientist, a designer and a manager, be able to unite specialists of different profiles for joint work, i.e. have a certain set of competences. It is the social order of the society to higher education, which is the basis of the National State Educational Standards for Higher Professional Education.

According to the standards, the objective of higher education is to provide students with a set of general cultural and professional competencies. The professional competencies (L. Hanushchak-Yefimenko, 2021) imply readiness to perform the following types of professional activities: design and development, production and technological, research, organizational and managerial, installation and commissioning, service and maintenance. Among these types of professional activity the research and development activity is of particular importance. This is evidenced by the Concept of long-term socio-economic development of Ukraine for the period up to 2030, which notes that "one of the main conditions for the development of higher professional education system is the involvement of students and teachers in fundamental and applied research", which will allow "not only to maintain the world-known Ukrainian scientific schools, but also to raise a new generation of researchers, focused on the needs of innovative knowledge economy" (Hanushchak-Yefimenko, 2021).

Consequently, the research activities of student youth will be understood as a type of creative, cognitive activity associated with the search for solutions to problems with a previously unknown result. The peculiarity of the process of research activity of student youth is an individual approach to the creative self-realization of each student. The result of research activities of student youth is an intellectual product, which includes new knowledge; development of critical thinking, cognitive activity, independence, initiative in learning (Lopatenko, 2016).

Based on the analysis of scientific literature, the essence of the concept of "students' research activity" we formulated the definition of "students' readiness for research activity", which we consider as a personal formation that determines the state of personality of the subject and includes motivational and value attitude to this activity, system of methodological knowledge, research skills, allowing their productive use in solving emerging professional and pedagogical tasks.

The aim of the article is to substantiate the technology Hackathon-ecosystem for diagnosing the readiness of student youth to research activities. The study was by interviewing students and teachers, processing the results in Kyiv National University of Technologies and Design (KNUTD) in 2021.

MATERIALS AND METHODS.

To survey students on the degree of their readiness for research activities, the tools of the University Hackathon Ecosystem were used. To collect and process the obtained information, the "Methodology for studying students' adaptation to dual education in higher education" was used (Gryshchenko, 2015).

RESULTS AND DISCUSSION.

The structure of students' readiness for research activity includes the following interrelated components: motivational, characterizing cognitive interest, motivation of research activity; orientational, including ideas about the methodology of scientific research and ways of research activity; activity, determining the possession of skills and abilities of research activity; reflexive, including self-assessment and self-analysis of own research activity. The degree of formation of each of these components is an objective indicator of the level of readiness of the future specialist to research activities within their specialization.

In accordance with the defined components the following criteria were developed: motivational, orientational, activity, reflexive.

Based on the developed criteria we determined the levels of students' readiness to research activities:

- high level is characterized by understanding the importance of research activities, interest in research activities, possession of the logic of scientific research, the ability to independently plan their own research work and implement it, the ability to analyze their own activities and identify ways and ways of self-development;

- the average level is characterized by a superficial understanding of research activities, lack of skills in research activities, unstable interest in the studied disciplines and research activities, incomplete possession of basic knowledge and skills, desire for self-education, but not always adequate assessment of own activity;

- low level is characterized by unstable interest in the studied disciplines, lack of understanding of social and personal significance of research activity, inability to work with literature, see the problem, identify contradictions, inability to build the logic of research independently, insufficient satisfaction with own activity, minor reflection of own activity, not always adequate self-assessment, fragmented self-analysis.

To study the qualitative side of students' readiness for research activities, a study was conducted with the participation of 155 students of Kyiv National University of Technologies and Design.

At this stage, control and experimental groups were formed. The control group included the students of the specialty "Entrepreneurship in the hotel and restaurant business" consisting of 70 people, the experimental group included the students of the specialty "Design" consisting of 75 people.

At the ascertaining stage of the experiment the questionnaire "Determination of the level of readiness of university students to research activity" was developed, also for the analysis of the motivational component of readiness the methodology "Methodology of studying students' adaptation to dual education in higher school" was offered to the respondents (Gryshchenko, 2015).

The results of the ascertaining stage of the experiment showed that 70% of students have significant difficulties in the organization of research activities; 75% of respondents believe that the university created not enough conditions to stimulate the motivation of students to engage in research activities. In addition, 75.5% of the students have a low level of readiness for research activities, 16.2% – average, and only 7.5% – high.

The analysis of the results of the conducting stage of the experiment led to the conclusion about the necessity of complex formation of students' readiness for research activities, search of forms and methods of additional stimulation of students' motivation for scientific research activity.

Formation of students' readiness of KNUVD for research activities is carried out in the form of creating an additional course for students ("Fundamentals of research digital activities"); inclusion of the research component in existing courses; involvement of students in the development and implementation of research projects in the online system; hearing reports of students on the results of the digitalization of their research, discussion of each report.

The research work of students in the university can be divided into academic research work of students and extracurricular research work, which, in turn, includes the research work that complements the educational process, and research work parallel to the educational process (Hanushchak-Yefimenko, 2021).

Student research work is an activity, which is determined by the curriculum and work programs, creates the prerequisites for the involvement of students in active research work. Educational and research work of students assumes high activity and independence of students in the learning process, which contributes to a deeper mastering of the program material, acquiring not only a certain amount of knowledge, but also sustainable skills of their practical application.

Extracurricular research work is directly related to the educational process, but takes place in extracurricular time and has a qualitative specificity, relative independence and its own logic. Its features are that it is based on the principles of independence and voluntariness of students and brings together students of different faculties, specialties, courses and levels of training.

The main objective of extracurricular research work, supplementing the educational process is to go beyond the curriculum, individualization of the educational process, the creation of prerequisites to ensure the continuation of postgraduate studies.

The purpose of extracurricular research work, parallel to the educational process, is the scientific professionalization of students under the guidance of teachers and researchers.

Due to the specifics of universities different types of research work of student youth are possible. For technical universities certain types of research work of student youth are the most characteristic, presented in figure 1.

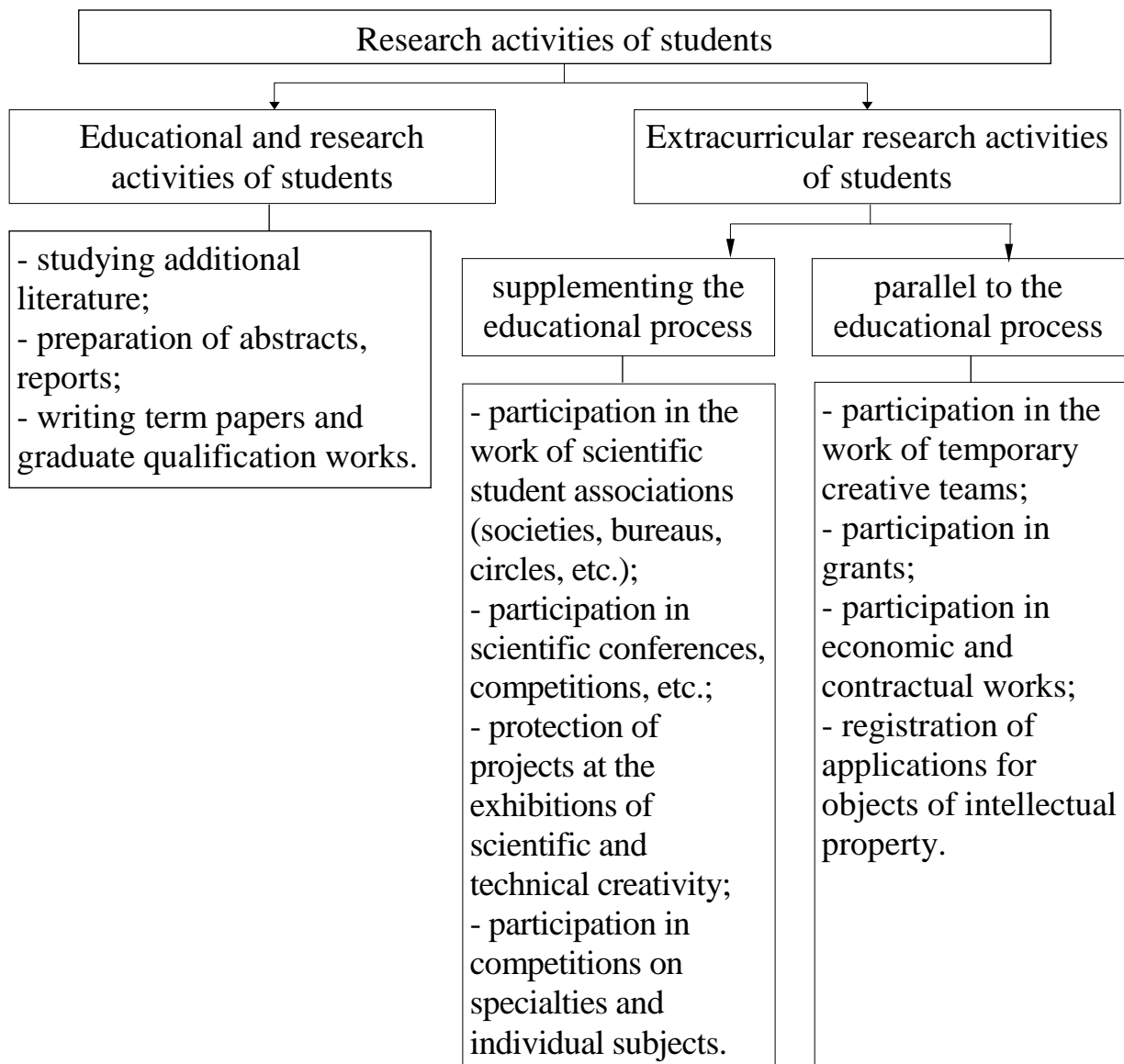


Fig. 1. Types of research activities of student youth in a technical university

Research activity of students is realized through the performance of course and diploma projects, participation of students in scientific-practical conferences, competitions of students' scientific works, in business games in the form of debates of various formats, in the Olympiads of various levels.

Undoubtedly, a special role in the formation of this type of readiness is played by professional activities of the teacher, academic supervisor, who contribute to the successful mastering of students' skills and abilities in research activities.

Teachers' activities include supporting educational activities of students in basic education, identifying and analyzing the level of students' readiness for research activities, creating opportunities for students to implement scientific research (setting, assistance in choosing and solving research problems); conducting individual consultations, stimulating students' motivation; analysis of teaching activities and results of interaction with students.

Students' activities integrate mastering of social experience as provided by the educational standard, and necessary to set, solve, present and self-analyze the results of their own research activity.

The activities of teachers and students mutually influence each other, reflecting the parity in the relationship between the teacher and the student: correction with the student is carried out, the teacher plans the content of professional training in accordance with individual and personal characteristics of the student.

The effectiveness of the proposed measures for the formation of university students' readiness for research activities is confirmed by the results of the re-study experiment (control section), conducted at the end of the experimental work. The number of students with a low level of readiness for research activities in the experimental group decreased by 55.5%, in the control group by 15.5%; the number of students with an average level of readiness in the experimental group increased by 27.5%, in the control group by 11.2%; the number of students with a high level of readiness for research activities increased by 27%, in the control group by 5.2%. The results of the experiment were mathematically processed using Fisher's multifunctional criterion.

Analyzing the results obtained in the experimental and control groups, it should be noted that positive shifts in the levels of students' readiness for research activities occurred in both the experimental and control groups. This means that even within the traditional teaching methodology there is an increase in the level of students' readiness for research activities as they accumulate experience in learning and research work. However, this process proceeds less intensively than in the experimental group, where a set of activities, contributing to the successful formation of the readiness of university students to research activities is introduced.

Thus, the study carried out with the help of Hackathon-ecosystemy university toolkit confirmed the effectiveness of the highlighted set of measures for the formation of university students' readiness for research activities.

It can be concluded about the effectiveness of the competence approach to the comprehensive solution of the problem of our research.

The competence-based approach prioritizes not informativeness, but the ability to solve problems arising in standard and non-standard situations of professional activity. It is characterized by both strengthening of pragmatic and humanistic orientation of the educational process in higher education.

Analysis of different types of research work shows that in a technical university scientific activity forms the student's skills both in speaking in a large audience to attract attention to his work (conferences, exhibitions, etc.) and in painstaking search of literary and reference sources to develop new technical solutions. This allows, on the one hand, to gain experience in design activity, and on the other hand, to lay the foundations of leadership and management skills. That is why it is necessary to begin to intensify research work from the first days of higher education, and the key role here should be given to the teaching staff.

Requirements for the level of formation of professional competencies in the field of research activities are presented in the University Hackathon Ecosystem. In order to identify the content of professional competencies of a technical university student, an analysis was conducted with the help of the University Hackathon Ecosystem tools for the following undergraduate training areas: "Entrepreneurship in the Hotel and Restaurant Business", "Design". Student's professional competencies in research activities include:

- readiness to create, master and provide quality of new techniques;
- ability to apply progressive production technologies;
- readiness to take part in scientific research;
- ability to draw up the results of research in the form of articles and reports at scientific-technical conferences, competitive works;
- ability to organize protection of intellectual property rights (inventions, utility models, industrial designs, computer programs and databases);
- creation of a portfolio of innovations and innovations.

Consequently, the process of forming professional competencies of technical university students in the field of research activity will be effective if the university creates conditions for the development and improvement of scientific creativity of young people: organizational, methodological, material and technical. In our opinion, the most important of these conditions is the presence of a certain infrastructure in the university, providing concentration of labor, material, financial and other resources, preservation and strengthening of basic, determining nature of science for the development of higher education, attracting young researchers to scientific activity (students of schools, lyceums, technical schools, students and graduate students).

There are different structural divisions in Kyiv National University of Technologies and Design responsible for different directions of scientific-

research work. For example, the departments are responsible for scientific research work that includes studying additional literature, preparing reports and essays, writing term papers and graduate qualification works. The student research society, research training department, youth innovation and technology center, intellectual property sector, the center of educational-scientific-innovative activity involve students in extracurricular research work. Moreover, these structural units supervise certain types of extracurricular research work. Student Scientific Society and Department of Scientific Workforce Training stimulates the participation of students in scientific conferences, competitions, contests on specialties and individual subjects and exhibitions of scientific and technical creativity of young people. Technology Transfer Department ensures the participation of students in grants for youth support, innovation forums. Sector of Intellectual Property involves students in the creation of intellectual property objects (inventions, utility models, industrial designs, computer programs and databases).

Organization of scientific-innovation activity of students in KNUTD includes several stages. At the first stage students of the 1st and 2nd years are involved in the annual student scientific and practical conference "Actual problems of science and education". The specifics of this conference is that senior students act as research supervisors of junior students. In addition, at this stage the essay contest "Science in my life", "Intellectual marathon", the university round of the contest for the best scientific work of students are held. The second stage involves the inclusion of the most active students in the student scientific society. At the third stage students who take an active part in scientific-innovative activity choose the direction of scientific research in which they will be engaged in the future. The fourth stage is characterized by students' participation in competitions of research works, Olympiads on specialties and individual subjects, students' involvement in inventive and patent-licensing activity. At the fifth stage publications of students in collections of scientific works, participation in exhibitions of KNUTD are carried out. The sixth stage foresees participation of students in competitions of international and all-Ukrainian grants, in youth innovative forums. The seventh stage opens the prospect of entering graduate and postgraduate programs and the opportunity to subsequently stay to work as teachers in the departments at the university.

CONCLUSION.

The result of the organization of research work in KNUTD, based on the competence approach using the tools of the University Hackathon ecosystem, is the positive dynamics of the formation of professional competencies in the field of research and innovation activities, expressed in an increase in such indicators as:

- the number of students who participated in research and innovation activities;

- the number of exhibits presented at the exhibitions with the participation of students;
- the number of intellectual property objects created in co-authorship with the faculty;
- number of prizes, awards and diplomas received by students by the results of participation in the events of regional, national and international levels.

Thus, research and innovation activity is an integral part of successful training of university students, having a positive impact on the formation of professional competencies. Its performance indicates the degree of students' readiness for further research and innovation activity.

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CONFLICT OF INTEREST.

There is no conflict of interest.

ABBREVIATIONS:

<i>Eq.</i>	Equation
<i>fig.</i>	Figure
<i>HEI</i>	Higher education institution
<i>HETT</i>	Hackathon Ecosystem of Technology Transfer
<i>KNUTD</i>	Kyiv National University of Technologies and Design

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