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INTERDISCIPLINARY APPROACH TO DESIGNING COMPETENCY MODELS FOR HIGHER EDUCATION STUDENTS

Natalia Kulalaieva

Doctor of Pedagogical Sciences, Professor, Professor of the Department of Pedagogy and Psychology of the Kyiv National Economic University named after Vadym Hetman, http://orcid.org/0000-0002-8613-1495, e-mail: kulalaieva.nataliia@kneu.edu.ua

Abstract

Relevance:. the paper analyzes the competency models of employees of modern companies, the design of which for higher education students should be carried out on the basis of an interdisciplinary approach. Practical recommendations have been prepared that should be taken into account when developing and implementing interdisciplinary educational programs in higher education institutions.

Objective. The objective of the paper is to highlight the essence, formats and principles of interdisciplinarity, analyze competency models of employees of modern companies and formulate practical recommendations for improving the process of developing and implementing interdisciplinary educational programs for training higher education students.

Methods: study of regulatory documents, scientific and journalistic sources - to clarify the essence, formats and principles of interdisciplinarity; theoretical analysis and synthesis - to present models of competence of employees of modern companies; generalization of scientific views on the problem under study - to formulate recommendations and conclusions.

Results: based on the analysis of scientific publications and analytical reports of leading researchers in the field of interdisciplinarity, the essence, formats and principles of interdisciplinarity are characterized, the strengths and weaknesses of various models of competence of employees of modern companies are analyzed and, based on this, appropriate practical recommendations are formulated.

Conclusions. Designing various models of competence of higher education students based on an interdisciplinary approach is a rather complex but promising process for meeting the future needs of the economy. Its coordination with regulatory documents and employer requirements will make it possible to train modern specialists capable of solving complex problems and responding in a timely manner to the rapidly changing conditions of the modern labor market

Keywords: *interdisciplinarity, interdisciplinary approach, competency models, modern companies, employees, higher education students, interdisciplinary educational programs.*

Introduction. The rapid development of modern technologies, the need to increase industrial efficiency, and the growth of Industry 4.0 place increasingly high demands on the quality of professional training and the level of competence of the future personnel of business entities. Therefore, today, increasing attention is focused on the "Da Vinci Effect" – the ability to create innovations by integrating knowledge and experience from various fields. An interdisciplinary approach is becoming the foundation for adaptive thinking, integrated planning, and sustainable innovation (What Is the Importance …, undated). Representatives of diverse subject areas and specialties view problems from different perspectives and solve them effectively. Such a balance of knowledge enhances the reliability of any project, as this approach increases the likelihood of identifying blind spots. By distributing tasks according to subject matter expertise, the time required for their completion is significantly reduced, and productivity is increased. By encouraging

interdisciplinary innovation, companies ensure the relevance and innovativeness of proposed solutions, thereby gaining competitive advantages. They can adapt more quickly to market changes, adjust their strategies, create revolutionary solutions, and satisfy broader customer needs. At the same time, their employees have the opportunity to engage with different ideas and workflows, which facilitates their adaptation and cross-training.

Sources. It is necessary to emphasize that modern companies recognize the immense value of employees who combine deep expertise in a specific field with a broad understanding of other disciplines. Such "T-shaped" specialists are adaptive, capable of collaboration, and adept at creating innovations. This enables them to be indispensable for ensuring team success and enterprise growth (The Ultimate Guide to Building T-Shaped …, 2024). In this context, soft skills acquire particular significance: leadership, communication, emotional intelligence, cross-functional collaboration, adaptability and learning agility, strategic thinking, mentorship, and knowledge sharing. according to G. Baskoro (Baskoro, 2024), skills such as digital and business literacy, innovativeness, and a culture of change are also substantial for Industry 4.0.

K. Neeley and B. Steffensen, as a result of analyzing publications within the scientific discourse of the USA and Germany regarding the development of the T-shaped professional model, concluded that there are certain difficulties in its implementation (Neeley, & Steffensen, 2018). Thus, the issue arose regarding the development of soft skills that do not clearly correspond to the disciplinary structures of academic institutions or the expertise of faculty, particularly at the undergraduate level. Furthermore, interdisciplinary educational programs often lack integration, and parts of the programs (disciplinary spheres) remain separate columns of knowledge acquired in parallel.

In the Ukrainian educational landscape, an interdisciplinary approach is already being actively utilized, particularly in scientific-pedagogical research. Moreover, interdisciplinary educational programs are becoming widespread in higher education institutions (Order of the Ministry of Education and Science of Ukraine, 2025, March 21). These programs combine subject areas of two specialties within one or two fields of knowledge (joint interdisciplinary educational programs), select components of subject areas from three to five specialties within one or various fields of knowledge (combined), or subject areas of all or part of the specialties within one field of knowledge (field-specific).

The aforementioned educational programs, which regulate the content and process of professional training for higher education learners, are developed on the basis of educational standards. It is in these standards that the set of general and special (professional) competencies and learning outcomes, which must be formed in learners according to the chosen specialties, is presented. When designing interdisciplinary educational programs, it is necessary to ensure the formation of competencies at the appropriate level of the National Qualifications Framework (Resolution of the Cabinet of Ministers of Ukraine, 2011, November 23). Additionally, some standards specify the mandatory nature of ensuring the formation of certain competencies and learning outcomes (Order of the Ministry of Education and Science of Ukraine, 2021, March 11). According to the requirements for interdisciplinary educational (scientific) programs, learners have the opportunity to freely choose elective courses constituting no less than 10% of the total volume of program credits (Order of the Ministry of Education and Science of Ukraine, 2025, March 21).

However, an established approach to the professional training of future specialists with interdisciplinary thinking, as well as to the design of competence models for higher education learners grounded in an interdisciplinary approach, has not yet been formed.

The purpose of the paper is to elucidate the essence, formats, and principles of interdisciplinarity, to analyze the competence models of employees in modern companies, and to formulate practical recommendations for improving the process of developing and implementing interdisciplinary educational programs for the training of higher education learners.

Methods. Examination of regulatory documents, scientific, and publicistic sources – to clarify the essence, formats, and principles of interdisciplinarity; theoretical analysis and synthesis – to present competence models of employees in modern companies; generalization of scientific views on the researched problem – to formulate recommendations and conclusions.

Results and discussion. The concept of interdisciplinarity was first addressed in the scientific sphere in the work of the Organization for

Economic Cooperation and Development (OECD) in 1972. The document stated that scientific activity within the bounds of a single discipline is incomplete and requires broader coverage, as it is impossible to solve any problem without crossing disciplinary boundaries. It also recognized the need to bridge the gap between education and research.

It should be emphasized that the concept of interdisciplinarity was interpreted in various ways throughout its study in the 20th century. It was viewed as a methodology, a concept, a way of knowing, a style of thinking, a philosophy, a reflexive ideology, a corresponding process, etc. Today, it is understood as an approach to integrating knowledge, methods, and concepts from two or more disciplines (fields of knowledge) to solve complex problems, generate new knowledge, or teach theories and ideas that cannot be fully understood using the tools of a single discipline (Chettiparamb, 2007). It is aimed at reducing gaps between disciplines, facilitating more effective solutions to problems that cannot be resolved within a single sphere of knowledge but require the use of unique strengths of different fields within a framework of mutual integration.

The level of integration of disciplines determines its formats: multidisciplinarity, pluridisciplinarity, interdisciplinarity, cross-disciplinarity, and transdisciplinarity (Artiushyna, Kulalaieva, Lavrinenko, Petrenko, & Romanova, 2024, pp. 101-102). Multidisciplinarity involves combining ideas from several disciplines, but their distinct boundaries are preserved, and no integration of their methodologies and concepts occurs. Pluridisciplinarity provides an opportunity for representatives of several disciplines to collaborate on solving a common problem without integrating their methodologies. Interdisciplinarity is classically understood as the synthesis and harmonization of diverse disciplinary perspectives into a single whole, which facilitates the creation of new ideas or structures for understanding complex problems. Cross-disciplinarity ensures a more fluid and dynamic crossing of boundaries between disciplines, paying greater attention to the use of methods from one discipline in another. Transdisciplinarity is the most integrative form of interdisciplinarity, crossing disciplinary boundaries and going beyond them, creating a unity of intellectual frameworks outside of disciplinary perspectives.

The general principles of interdisciplinarity include: methodological adaptability, problem orientation, and dynamic collaboration. Methodological adaptability ensures flexibility in creating methodological innovations and accepting different ways of knowing. Through the manifestation of creativity, new ideas are created and solutions are generated, which contributes to a comprehensive understanding of problems. Orientation towards their solution, or a problem-oriented approach, provides the opportunity to focus on specific issues and examine them from different points of view, engaging tools from various disciplines for their complex resolution. Dynamic collaboration involves combining diverse disciplinary views to generate a solution while observing mutual respect and mutual support within the team, and also enables the development of effective communication strategies for understanding disciplinary languages and cultures.

Furthermore, in foreign literature, the concept of interdisciplinary pedagogy is encountered (Chettiparamb, 2007). It is aimed at fostering in young people a sense of their own authorship, as well as a situational and prospective view of knowledge that can be applied when solving complex problems. The majority of educational approaches associated with interdisciplinarity are based on active learning strategies and facilitate the development of cognitive skills in learners. In particular, this concerns the development of higher-order critical thinking skills (analysis, synthesis, application, evaluation), which involves the use of problem-based and cooperative learning methods, as well as discovery-based learning.

Precisely such training will contribute to the formation of a special type of universality that combines deep knowledge in one field with a wide set of additional skills. In view of this, it is advisable to turn to the experience of international companies regarding their understanding of employee competence models. The most common among them is the T-shaped model, in which the vertical bar reflects the specialist's unique abilities and skills, as well as the depth of their knowledge in a specific field, while the horizontal bar reflects their ability to use these skills and abilities to collaborate with others across different fields of knowledge (Wale, undated). Specialists with a T-shaped competence model are experts in one field and have a broad worldview in related spheres and developed soft skills, which gives them the opportunity to form the

best interdisciplinary teams in a company. The I-shaped competence model characterizes the deep expertise of employees in a single field (Rahman, 2024). However, recently, due to the fact that user needs and technologies are changing with extraordinary speed, specialists with a Pi-shaped (Π-shaped) competence model are becoming increasingly in demand by employers. Such a competence format implies possessing deep expertise in two fields and broad awareness, flexibility, and, accordingly, the employee's capability to realize themselves in two directions (Herranz, 2023). Moreover, under conditions of uncertainty and multidimensional reality, professionals with several "verticals" of expertise, who are knowledgeable in several fields and possess skills for their integration, creation of innovations at the intersection of technologies, and the ability to generate holistic solutions, are gaining demand. By combining processes, people, and ways of thinking, they unlock value that cannot be realized by specialists with linear models (Weis, 2025). Specialists with a formed X-shaped competence model have deep expertise in several fields with an "intersection" in the form of experience; they are highly adaptive, can work well in several industries, and possess high-level interpersonal and managerial skills. According to T. Vipond, interpersonal skills should include: effective teamwork, empathy, communication skills, management and conflict resolution, constructive feedback, cognitive flexibility, adaptability, the ability to motivate others, networking capacity, public speaking and presentation skills, leadership, experience transfer, strategic thinking, tolerance, etc. (Vipond, undated). Such professionals can work with different people in different industries or areas of a company, and are also capable of uniting these different groups (indicated by the cross-section of the letter X) so that they can cooperate effectively (Wale, undated).

It is worth emphasizing that the classical training of higher education learners in Ukrainian universities was largely focused on forming an I-shaped competence model in them. However, the successful reform of Ukraine's higher education system, the opening of interdisciplinary educational programs, increased attention to the comprehensive development of the learners' personality, particularly their soft skills, the promotion of lifelong learning, etc., create conditions for the introduction of various competence models demanded by the modern labor market.

Conclusions. Based on the study of the essence, formats, and principles of interdisciplinarity and the results of the analysis of employee competence models in modern companies, the following practical recommendations were formulated to improve the process of developing and implementing interdisciplinary educational programs for the training of higher education learners:

- developers of educational programs (particularly interdisciplinary ones) should be familiarized with various competence models of higher education learners, and also involved in the systematic analysis of labor market needs for interdisciplinary specialists to determine the "intersection points" of disciplines most relevant for Ukraine (IT and medicine, education and economics, IT and agriculture, etc.);
- competencies and learning outcomes presented in higher education standards require harmonization with the knowledge, skills, and abilities that higher education learners must master to form corresponding competence models;
- during the direct design of interdisciplinary educational programs, special attention must be paid to the selection of educational components, which should correspond as closely as possible to the content component of the competence model (for the T-shaped competence model – disciplines of in-depth specialization, interdisciplinary courses, and soft skills training; for the Pi-shaped model – ensuring parallel study of educational components for two specialties, their integration, and the implementation of integrative courses);
- to ensure the effectiveness of the educational process, it is advisable to apply methods of problem-based and cooperative learning (projects with interdisciplinary tasks; cases requiring solutions involving knowledge from different disciplines), as well as discovery-based learning;
- with the aim of ensuring greater integration between faculties and departments, as well as employers, it is necessary to introduce infrastructural changes for university spaces: to create various hubs, laboratories, business incubators, etc., comprised of representatives from different departments and faculties and representatives of employer enterprises; to introduce internships for scientific-pedagogical staff in companies where interdisciplinary competencies are needed; to involve practitioners with

interdisciplinary experience in the educational process, etc.

Thus, the design of various competence models for higher education learners on the basis of an interdisciplinary approach is a rather complex process, but one that is promising for ensuring the future needs of the economy. Its alignment with regulatory documents and employer requirements will make it possible to train modern specialists capable of solving complex problems and responding in a timely manner to the rapidly changing conditions of the modern labor market. In further scientific explorations, we envisage the direct development of T- and Pi-shaped competence models for higher education learners undergoing training in interdisciplinary educational programs.

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МІЖДИСЦИПЛІНАРНИЙ ПІДХІД ДО ПРОЄКТУВАННЯ МОДЕЛЕЙ КОМПЕТЕНТНОСТІ ЗДОБУВАЧІВ ВИЩОЇ ОСВІТИ

Наталя Кулалаєва

доктор педагогічних наук, професор, професор кафедри педагогіки та психології Київського національного економічного університету імені Вадима Гетьмана, http://orcid.org/0000-0002-8613-1495, e-mail: kulalaieva.nataliia@kneu.edu.ua

Реферат:

Актуальність: у роботі проаналізовано моделі компетентності працівників сучасних компаній, проєктування яких для здобувачів вищої освіти має здійснюватися на підґрунті міждисциплінарного підходу. Підготовлено практичні рекомендації, котрі мають бути враховані під час розроблення та провадження міждисциплінарних освітніх програм у закладах вищої освіти.

Мета: полягає у висвітленні суті, форматів та принципів міждисциплінарності, аналізі моделей компетентності працівників сучасних компаній та формулюванні практичних рекомендацій для поліпшення процесу розроблення й провадження міждисциплінарних освітніх програм для підготовки здобувачів вищої освіти.

Методи: вивчення нормативних документів, наукових та публіцистичних джерел – для з'ясування суті, форматів та принципів міждисциплінарності; теоретичний аналіз та синтез – для представлення моделей компетентності працівників сучасних компаній; узагальнення наукових поглядів на досліджувану проблему – для формулювання рекомендації та висновків.

Результати: на підґрунті аналізу наукових публікації та аналітичних звітів провідних дослідників у сфері міждисциплінарності охарактеризовано суть, формати та принципи міждисциплінарності, проаналізовано сильні та слабкі сторони моделей компетентності працівників сучасних компаній та на основі цього сформульовано відповідні практичні рекомендації.

Висновки. Проєктування різноманітних моделей компетентності здобувачів вищої освіти на підґрунті міждисциплінарного підходу є доволі складним але перспективним для забезпечення майбутніх потреб економіки процесом. Його узгодження з нормативними документами та вимогами роботодавців дасть можливість підготувати сучасних фахівців, здатних вирішувати комплексні проблеми та вчасно реагувати на швидкозмінні умови сучасного ринку праці.

Ключові слова: *міждисциплінарність, міждисциплінарний підхід, моделі компетентності, сучасні компанії, працівники, здобувачі вищої освіти, міждисциплінарні освітні програми.*

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