Zhytomyr Ivan Franko State University Journal. Pedagogical Sciences. Vol. 3 (114)

Вісник Житомирського державного університету імені Івана Франка. Педагогічні науки. Вип. 3 (114)

ISSN (Print): 2663-6387
ISSN (Online): 2664-0155

UDC 37.016:378.147:001.891
DOI 10.35433/pedagogy.3(114).2023.16-28

THE RECEPTION OF AN INTERDISCIPLINARY APPROACH IN SCIENTIFIC THOUGHT

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The article examines the degree of study of the interdisciplinary approach in foreign and Ukrainian scientific discourse based on the material of publications of the second half of the 20th – beginning of the 21st century. It is noted that the appearance of a large amount of research works is due to the complexity and multifaceted nature of the phenomenon.

The study traces the formation of the idea of interdisciplinarity, starting from the 70s of the XX century in the works of L. Apostel, H. Berger, M. Boisot, A. Briggs, P. Duguet, H. Heckhausen, E. Jantsch, J.T. Klein, J. Kockelmans, A. Lichnerowicz, G. Michaud, M. Nissani, J. Piaget and others. It was found that the first works focused on understanding the essence of the concept, searching for a comprehensive definition, developing classifications, distinguishing the advantages of an interdisciplinary approach compared to a disciplinary one, studying their connection and interdependence, predicting the future of the concept, etc. Attempts to present the application of the interdisciplinary approach in practice in the works of L. De Greef, G. Post, C. Vink, and L. Wenting were also considered.

In the research process, theoretical (analysis and synthesis, systematization, generalization of scientific literature) and comparative (comparison of different ideas and opinions on the problem) methods were applied. The conclusion states that the understanding of the interdisciplinary approach in the context of scientific research and the higher education system has intensified in the foreign scientific discourse. The scientists focused on the study of the theoretical dimension of the problem and the practical application of the acquired knowledge: the development of programs and projects to solve urgent scientific and educational issues. It is also noted that Ukrainian researchers, relying on the experience of foreign colleagues, are making attempts to develop models of application of the ideas of interdisciplinarity in the education system, and this contributes to the improvement of the domestic educational process.

Keywords: *interdisciplinarity, interdisciplinary approach, disciplinary approach, higher education system, scientific research, scientific discourse.*

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Zhytomyr Ivan Franko State University Journal. Pedagogical Sciences. Vol. 3 (114)

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ОСМИСЛЕННЯ МІЖДИСЦИПЛІНАРНОГО ПІДХОДУ В НАУКОВІЙ ДУМЦІ

А. А. Іщенко

У статті досліджено ступінь вивчення міждисциплінарного підходу в зарубіжному та українському науковому дискурсі на матеріалі публікацій другої половини XX – початку XXI століття. Зазначено, що поява великої кількості розвідок зумовлена складністю і багатогранністю явища.

Дослідження простежує шлях формування ідеї міждисциплінарності, починаючи з 70-х рр. XX ст. у працях Л. Апостела, Г. Бергера, А. Брігс, М. Буазо, П. Дуге, Дж. Т. Кляйн, Дж. Кокельманс, А. Ліхнеровича, Г. Мішо, М. Нізані, Ж. Піаже, Х. Хекгаузена, Е. Янча та ін. З'ясовано, що перші праці зосередили увагу на осмисленні сутності поняття, пошуку вичерпної дефініції, розробці класифікацій, виокремленні переваг міждисциплінарного підходу у порівнянні з дисциплінарним, вивченню їх зв'язку і взаємозалежності, прогнозуванні майбутнього концепції тощо. Також були розглянуті спроби представити застосування міждисциплінарного підходу на практиці у працях К. Вінк, Л. Вінтінг, Л. Де Ґріф, та Г. Пост.

У процесі дослідження були застосовані теоретичні (аналіз і синтез, систематизація, узагальнення наукової літератури) та компаративний (порівняння різних ідей та думок щодо проблеми) методи. У висновку зазначено, що у закордонному науковому дискурсі активізувалося осмислення міждисциплінарного підходу у контексті наукових досліджень та системи вищої освіти. Вчені зосередили увагу на дослідженні теоретичного виміру проблеми та практичному застосуванню здобутих знань: розробці програм та проєктів для вирішення нагальних наукових та освітніх питань. Також зазначено, що українські дослідники, спираючись на досвід закордонних колег, здійснюють спроби розробки моделей застосування ідей міждисциплінарності в системі освіти, і це сприяє покращенню вітчизняного навчального процесу.

Ключові слова: *міждисциплінарність, міждисциплінарний підхід, дисциплінарний підхід, система вищої освіти, наукові дослідження, науковий дискурс.*

Introduction of the issue. The emergence and actualization of the already existing concept, principle, method, etc., causes numerous kinds of research. Since their appearance in pedagogical thought, the terms "interdisciplinarity" and "interdisciplinary approach" have been interpreted many times in the various studies of foreign and domestic authors. Starting from the second half of the 20th century, researchers focused on finding comprehensive definitions, developing classifications, identifying, and understanding specific features of the phenomenon, attempting to predict its development, etc. At the beginning of the 21st century, numerous studies appeared that suggest using acquired theoretical knowledge in practice. Therefore, in our time, attempts to understand the interdisciplinary approach continue in multifaceted articles.

Current state of the issue. In the foreign scientific discourse, there have frequently appeared studies devoted to the review of the works of famous researchers of interdisciplinarity, for example, L Apostel, G. Berger, M. Boisot, P. Duguet, R. Frodeman, J.T. Klein, M. Nissani, etc. These are mainly works of theoretical orientation, which aim to investigate the genesis of interdisciplinarity, follow the formation of the terminological apparatus, note the advantages compared to the disciplinary approach, etc., and compare the opinions of scientists on these issues. These are articles by E. Aarts, P. Valcke, and T. Wilthagen, F. Darbellay and D. Wernl, J.A. Jacobs, M. Kronfeldner and R. Meunier, J.P. Martínez, J. Peiró, D.I. Rosales and A.I. Vargas, V. Politi, A. Repko and R. Szostak, H. Stuart, J. Persson and H. Thoren etc.

Attempts to present the application of an interdisciplinary approach in practice have also become widespread in the scientific discourse. The studies of the following authors attract attention: E.M. Amiri, L. Evis, S. Gimatzidis, N. Iqbal, B. Weninger, C. Von Rüden and K. Kopetzky, A. Kanmaz, Y. Karalı, N. Rekha, T. Spinde, A. Friedow, J. Green

and W. Stroup, M. Sharma, M. Shukla and E. Spelt, Li Yu and others.

Using the experience of foreign colleagues, domestic researchers paid attention to theoretical issues related to the approach application in scientific research and the organization of the educational process. An explanation of the essence of the problem and definitions of key terms can be found in A. Filipenko, O. Kazakevych, A. Kolot, Yu. Olizko, N. Terentiev, I. Shkura, and Yu. Shulyk, etc. O. Hordiichuk, I. Konovalchuk, A. Kryzhanovskyi, I. Lysyi, K. Mizin, G. Rebrov and A. Rebrov, T. Tybaikina, I. Sehetii, and others provide an understanding of individual ideas of interdisciplinary. A description of the interdisciplinary research methodology is available in V. Chebanov, N. Diachok, O. Kurhaiev, O. Palahin, S. Sysoieva, and others. Specific convincing examples of the introduction of innovative ideas for the domestic scientific and educational space can also be found in the works of N. Bilova, L. Dimova, A. Grinchenko, I. Humenna, G. Karas, K. Karpenko, V. Khmarovskyi, V. Krasnomovets, O. Kuzmenko, O. Melnychenko, Y. Nakhaieva, V. Ohneviuk, O. Pryiatelchuk, O. Protsenko, V. Shvatskyi, O. Strakh, O. Stupnytskyi, O. Synekop, T. Yaroshenko, V. Yarovska, L. Zahvoiska, and many others. At the same time, there is a lack of works devoted to the reception of ideas of interdisciplinarity in the domestic scientific thought, which determines the relevance of our research.

Aim of research is to identify the degree of study of the interdisciplinary approach in foreign and Ukrainian scientific discourse.

Results and discussion. The interdisciplinary approach was actualized in the 20th century due to the international scientific seminar of the Organization for Economic Cooperation and Development (OECD) in 1970, the UNESCO conference "World Conference on Higher Education in the Twenty-first Century. Vision and Action". It is accentuated by a number of regulatory documents: Prague, Berlin, Bergen declarations, Yerevan, Paris and Rome communiques, etc [3; 4]. In scientific discourse interdisciplinarity is understood as "the application of insights and perspectives from more than one conventional discipline" [31]. Contemporary researchers are convinced that the increased attention to the interdisciplinary approach is explained by the following reasons: 1) the complexity of economic, social, management and other systems, the acquisition and development of which is impossible without borrowing knowledge, approaches and methods of various sciences (disciplines); 2) increasing mobility, transience, rapid changeability of everything that surrounds a person and the institutions created by him; 3) deepening the specialization of sciences (disciplines) [5]. Active development of the information space and constant updating of knowledge requires restructuring of the educational system according to the principle of synergy. This was the reason for the emergence of a large number of transdisciplinary scientific disciplines: synergetics (a special transdisciplinary reflection), acmeology, pedagogical anthropology, and earlier – pedology (as a synthesis of human sciences), anthroposophy (which arose at the intersection of psychology, art theory, intelligence, information, structural linguistics), suggestopedia (uses the achievements of physiology, medicine, psychology, psychotherapy, pedagogy), social pedagogy (integrates social and psychological-pedagogical research), pedagogical synergetics (applies universal principles of synergetics – systemicity, integrity, bifurcation, etc.), ecology, chronobiology, psychophysics, symmetry, homeostatics, evolution, biosymmetry, chronobiology, cosmopsychobiology, semantics, psychosemantics, paleopsychology (as a synthesis of human sciences and his cosmoplanetary environment), sexology (synthesis of all human sciences, including biology, anthropology, ethnology, philosophy, psychology, medicine, cultural studies) and others [8: 22-23].

Despite the fact that the idea of interdisciplinarity arose in the 20s of the 20th century within the scope of activity of the US Social Science Research Council, its scientific justification began much later, in the 1970s [31].

The first significant work devoted to the understanding of the concept was the report of the Organization for Economic Cooperation and Development (OECD) "Interdisciplinarity: problems of teaching and research in universities" (1972) [9]. The document is of international importance, because scientists from Australia, Austria, Belgium, Canada, Denmark, Finland, France, the Federal Republic of Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, the Netherlands, Norway, Portugal, and Spain took part in its preparation. The authors of the report consider interdisciplinarity as "an important key to the innovations required in universities to meet the intellectual and social demands of the present time" and interpret the interdisciplinary approach as a promising way that will help "to unify knowledge" [9: 11]. The researchers define the main goal of the work – to find out how effective interdisciplinarity is. They note that during the writing of their work, they relied only on the research of the problems in the universities of the OECD countries in a certain historical period – the 70s of the XX century, and therefore do not claim universality.

One of the authors of the work, P. Duguet, considers the actualization of interdisciplinarity in the system of higher education to be a natural phenomenon that comes from a disciplinary approach, which, combining different subjects, "displays the claim to universality and in a way to unity" in achieving the goal – to obtain the necessary set of knowledge in a particular specialty [9: 24]. Since the terminological apparatus was not formed at that time, the researcher explains the difference between "pluridisciplinary" and "interdisciplinary". Thus, by the first concept, he understands "simply ... the juxtaposition of disciplines"; by the second – "the integration of concepts and methods in these disciplines", i.e., relationship.

Based on the results of a survey among OECD universities, Guy Berger believes that the development of interdisciplinarity is explained by the demands of modern society and its nostalgia for the scientific and literary humanism of the eighteenth century. The researcher notes that "the eternal theme of a science of sciences or of absolute knowledge, the demand which science makes as the result of its expansion, the crisis in the university all these elements no doubt blend together to give the current historic dimension to interdisciplinarity" [9: 24].

In the section "Terminology and Concepts" Leo Apostel cites and analyses the reports of his colleagues Heinz Heckhausen, Marcel Boisot, Erich Jantsch, Andre Lichnerowicz, and Jean Piaget. The researcher believes that before talking about interdisciplinarity, it is necessary to clarify the essence of the concept of "discipline": it is "the concept of a transformation of non-legalised facts into organised facts, related to each other by laws, a transformation that is never completely finished and always leaves behind a certain residue yet to be transformed" [9: 78]. In the second part of the chapter, Leo Apostel presents his vision of the problem, emphasizing the ways of developing interdisciplinary scientific research developed by the Movement for Unified Science (Wiener Kreis), the Society for General Systems Research, the "Centre International d'Epistémologie Génétique" and related groups at Harvard and Stanford, through the application of general praxeology to the history of Science, made by Håkan Törnebohm, various groups of scientists and philosophers in the countries of Eastern Europe, who tried to apply the general principles of dialectical materialism to certain branches of science and considered in the "hermeneutics" of science as a system of symbols (Kassirer). The author considers these attempts to be promising, although "none of them is completely successful as yet" [9: 141]. The researcher concludes that it is impossible to avoid an

interdisciplinary approach in this historical period, "every science becomes an inter-science", and researchers work in conditions of knowledge synthesis [9: 179-180].

In the part of the collection "Problems and solutions" Asa Briggs (Asa Briggs) and Guy Michaud (Guy Michaud) focus attention on understanding the process of changes in the university as an institution and approaches to the accumulation and transfer of scientific knowledge, emphasizing interdisciplinarity as a phenomenon that "lies at the meeting point of these two currents, and is the direct consequence of them, so that it emerges as one of the key elements in any solution to the crisis in the University" [9: 183]. The researchers developed a model of an interdisciplinary university with a special emphasis on "international relations", which prioritizes communication between teachers and students "at the level of group life". They are convinced that the proposed model of the university contributes to the modelling of creativity, the creation by students of a new style of communication aimed at the future, etc.

The book "Interdisciplinarity and higher education" (1979), edited by Joseph J. Kockelmans, became the next important for understanding the problem. Like his predecessors, the researcher emphasizes the need to find comprehensive definitions of terms. In the chapter "Why interdisciplinarity?" he examines the essence of key concepts, understands directly interdisciplinarity "in the limited sense" of this word and characterizes the phenomenon of transdisciplinarity. The author understands interdisciplinarity as solving "important problems to be found in areas lying between the domains of existing disciplines, which neither of the respective disciplines is capable of adequately formulating and treating" [29: 94]. J. Kockelmans notes that in the scientific literature, this concept is considered in a broad (all non-disciplinary efforts in research, educational or administrative activities) and narrow (creation of a new discipline, the scope of which lies between two other disciplines that already exist) meanings. An example of the latter is social psychology, biophysics, psycholinguistics, etc.

In the 1970s and 1980s, UNESCO became interested in the problem of interdisciplinarity in education and science, dedicating to it the collections "Seminar on the training of teachers for and through interdisciplinarity" (1970) [36], "Interdisciplinarity in Higher Education" (1983) [35], "Interdisciplinarity in General Education" (1986) [34]. The reports note the rapid development of the approach, because "numerous problems of modern science lie on the borderlines of, and overlap, several disciplines" [34: 4]. At the same time, the absence of a clear definition of the term in the scientific discourse is emphasized. The UNESCO Symposium on Interdisciplinarity therefore proposed a definition (from the Director-General of Unesco to the Executive Board on the preparation of the Medium-Term Plan for 1984-1985 (113 EX/4, para. 426)), which was supported by all participants: "In epistemological terms, the concept of interdisciplinarity may be regarded as a form of co-operation between various disciplines, which contribute to the achievement of a common end and which, through their association, further the emergence and advancement of new knowledge" [34: 7]. In addition to searching for a comprehensive definition, important theoretical questions of classification, forms, themes, problems, and ideas were also considered.

The next important work for understanding the essence of the interdisciplinary approach was the collection of materials of the OECD conference "Interdisciplinarity Revisited: Re-Assessing the Concept in the Light of Institutional Experience" (1985). The participants of the event stated that, compared to the 1970s, interest in interdisciplinary interaction decreased, and disciplinarity began to dominate again. Thus, the debate about the interconnection and effectiveness of both approaches continued:

"interdisciplinarity, even when it succeeds in unscrambling existing curricula, remains a hostage to the disciplines" [30: 208]. As a result, the researchers came to the conclusion about the need for the cooperation of disciplines to solve important scientific problems.

Starting with the actualization of the interdisciplinary approach in the 1970s works dedicated to the understanding of the problem in the context of the educational process in a higher educational institution repeatedly appeared in the scientific discourse: S. Bailis "Interdisciplinary Curriculum Design and Instructional Innovation" (2002) [10], D. Mills and M. Huber "Anthropology and the Educational ″Trading Zone″: Disciplinarity, Pedagogy and Professionalism″ (2005) [32], F. Gabelnick ″Achieving Interdisciplinary Innovation: Leading and Learning in Community″ (2002) [18], N. Heckhausen ″Discipline and Interdisciplinarity" (1972) [20], etc. In particular, De Zure (1999), borrowing the ideas of J.T. Klein [27: 55], explains the functioning of the approach in the educational process as follows: "interdisciplinary initiatives are often described by the form or structure they take (e.g. team teaching), the motivation behind them (e.g. to serve societal or employment needs), how the disciplines will interrelate (e.g. math will be taught in the service of chemistry), or by labelling the level of integration (e.g. from borrowing to synthesis)" [16]. The researcher notes that the term "interdisciplinarity" in education is used in different ways as a concept, methodology, process, way of knowing and even philosophy.

In the period from the 70s to the 90s, many works aimed at distinguishing and characterizing the types of interdisciplinarity were published. In particular, J. Kockelmans is convinced that in the narrow sense of the concept of interdisciplinarity, it is distinguished from other non-disciplinary approaches in science and education using the terms: "multidisciplinarity" – teaching and research are carried out by teachers, who in each case act as disciplinary persons, under the guidance which, for example, a person can learn simultaneously or sequentially Greek, French and mathematics; "pluridisciplinarity" – scientific work (teaching, research, training), performed by one or several scientists, involves such a combination of different disciplines, with the help of which competence in one discipline implies the presence of thorough knowledge of others, for example, a biologist who is well understands physics, chemistry and mathematics; "crossdisciplinarity" – scientific work performed by one or more scientists who try to solve one or more problems using ideas and methods or techniques of some related disciplines (for example, economists, sociologists, doctors and architects try to find a better solution to the housing problem in a big city); "transdisciplinarity" is scientific work performed by a group of scientists, each of whom has an education in one or more different disciplines, to systematically study the possibilities of overcoming the negative side effects of specialization in order to make education (and research) more socially meaningful. Also, the author separately explains the meaning of the concept "disciplinary" – scientific work (research, teaching, or both) performed by one or several scientists within the same discipline (for example, the work of one mathematician or a group of mathematicians in the field of the discipline "mathematics") [29: 70-71]. Forming the list of concepts and their definition the researcher was guided by the following principles: the list of terms should not contain anything that is not directly related to the discussion on interdisciplinary issues; the list should be comprehensive in the sense that the labels chosen are adequate to characterize various non-disciplinary endeavours in teaching, research, and management; terminology should be defined as clearly as possible; neither the terminology itself nor the provided definitions should contain explicit references to scientific, methodological, socio-political or philosophical issues on

which there is no common agreement [29: 69].

M. Boisot proposed another type of classification, dividing the phenomena he defines as "the materialization of interaction between objects" into "crude" (have no explanation) and "legalised" (explained). The researcher's classification contains the following points: 1) linear interdisciplinarity – "crude" phenomena of one discipline are legalised (explained) by the laws of another discipline; 2) structural interdisciplinarity – "interactions between two or more disciplines lead to the creation of a body of new laws forming the basic structure of an original discipline that cannot be reduced to the formal combination of its generator"; 3) restrictive interdisciplinarity – although there is no direct interaction between the disciplines, they come into play through the field of application, where "each restrictive discipline imposes technical, economic or human bounds on the others" [12: 94-95].

It is also worth mentioning the investigations devoted to the study of the factors that lead to the emergence of interdisciplinarity. For example, D. Brewer, analysing the state of studying environmental problems, notes about interdisciplinarity as a means of filling the gaps existing in the traditional disciplinary system: "much high-quality science illuminates environmental problems, but it is often poorly organised or incomplete. It often does not have an interdisciplinary integration and synthesis that permit problems to be seen in a larger context, especially in an ecologically sensitive and sensible one" [13: 327]. The researcher emphasizes that a combination of different disciplines and methods is needed to solve a certain problem. A unanimous opinion is expressed by B. Rosamond, who explains the need for an interdisciplinary approach by the strengthening of globalization processes, that "is nothing less than an invitation to think about the pathological constraints that disciplinarity imposes upon the development of knowledge about globalisation and its consequences" [33: 518]. He believes that an interdisciplinary approach will be productive when researchers are aware of the "knowledge gap" that interdisciplinarity creates [33: 530].

It is worth mentioning the works in which doubts were expressed about the effectiveness of the increased accentuation of the interdisciplinary approach. Thus, J. Witte and J. Robitscher in the study "Interdisciplinarity and the Disciplines" (1999) note "bland intellectual ecumenism" – an attempt to unite all disciplines into one collective discourse or set of methods. Researchers worry that this drive will turn interdisciplinarity into a bureaucratic discipline that will produce simplistic knowledge [14]. B. Hansson also expressed arguments against interdisciplinarity in the work "Interdisciplinarity: For What Purpose?", defining it as a phenomenon that is "parasitical and cannot exist without disciplines" and something that cannot be achieved in practice [19: 340].

In the 70-90s of XX century considerable attention was paid to the study of the relationship between disciplinary and interdisciplinary approaches. For example, Bechtel [11; 22: 6] identified the following patterns of interaction: the development of conceptual connections using a point of view in one discipline to change the point of view in another discipline; recognition of a new level of organization with its processes to solve unresolved problems in the existing field; using research methods developed in one discipline to develop a theoretical model in another; modification and expansion of the theoretical basis from one area for application in another; development of a new theoretical framework that can change the conceptualization of research in a separate field, trying to integrate them. Another researcher, A. Karlqvist in his work "Going Beyond Disciplines: The Meanings of Interdisciplinarity" (1999) [21] singled out the types of interdisciplinary research: 1) unification of knowledge (an attempt to demonstrate that two things are a manifestation of the

same structure. If this happens, a new theory is formed and new methods are developed); 2) adding or accumulating knowledge from many fields to achieve a common goal; 3) knowledge is compatible, but requires additional interpretation to be meaningful; 4) not only the theories, but also the underlying assumptions and paradigmatic foundations for the theories differ, as in cases where the natural and social sciences merge; 5) the essence of theories and methods differs, and there are interpretive and conceptual differences in culture.

Reynolds considers disciplinary and interdisciplinary approaches to be equally effective, and their use depends on the type of problem situation. He singles out the following [22: 13]: intellectual tasks from a traditional discipline (disciplinarity); multidisciplinary problems, which are mainly intellectual, are not political activities but cannot be successfully implemented within the limits of one discipline (crossing the boundaries of particular disciplines); generated multidisciplinary problems increasingly by society and is characterized by relatively short courses that call in some cases for the result of a strategy, and in other cases for a quick technological solution to the problem (interdisciplinarity).

American professor Julie Thompson Klein made a significant contribution to the reception of interdisciplinarity. She has many works that are referred to by modern researchers: "Interdisciplinarity: History, theory, and practice" (1990) [27], "Crossing boundaries: Knowledge, disciplinarities, and interdisciplinarities" (1996) [24], "Transdisciplinarity: Joint problem solving among science, technology, and society: An effective way for managing complexity" (2001) [28], "Interdisciplinarity and complexity: An evolving relationship" (2004) [26], "Humanities, culture and interdisciplinarity" (2005) [25], "Beyond interdisciplinarity: Boundary work, communication, and collaboration in the 21st century" (2021) [23] and others.

In the 1990s, J.T. Klein interprets interdisciplinarity as a promising approach. She explores the genesis of the phenomenon, noting that over the last century its essence has been explained as a methodology, a concept, a process, a way of thinking, a philosophy, and a reflexive ideology, etc. The researcher is convinced: the desire to improve the educational process, to avoid fragmented knowledge is the factor that contributed to the constant return to the problem in different chronological periods. The author gives such a definition of the concept: "Interdisciplinarity is a means of solving problems and answering questions that cannot be satisfactorily addressed using single methods or approaches. Whether the context is a short-range instrumentality or a long-range reconceptualization of epistemology, the concept represents an important attempt to define and establish common ground" [27: 196]. The professor analyses the current state of the higher education system and notes: boundaries between disciplines are disappearing with the help of borrowing knowledge, increasing specialization within disciplines, and involving (and financing) the solution of complex social and technical problems: "The interactions and re-organisations that boundary crossing creates are as central to the production and organisation of knowledge as boundary formation and maintenance and further that close inspection of boundary crossing reveals that disciplinarity and interdisciplinarity are productive tensions in a dynamic of supplement, complement and critique" [24: 2]. At the same time, the author notes that academic departments, funding mechanisms, and expert evaluation processes remain traditionally within the boundaries of a disciplinary approach, and this hinders the development of innovativeness [24].

An important achievement in the study of the interdisciplinary approach is the publication of "The Oxford Handbook of Interdisciplinarity" [17], which was created over 25 years and was published in 2010 and 2017 and is positioned as a summary of long-term studies of the problem. The authors of the chapters are

well-known researchers of the problem G. Bammer, K.L. Hall, S. Henry, K. Holley, J.A. Jacobs, J.T. Klein, P.J.S. Marti, B.A. Stipelman, S. Turner, A.L. Vogel, etc. The book consists of the following parts: "The Landscape of Knowledge", "Inter- and Transdisciplinarity and the Disciplines", "Interdisciplinary Fields", "Crosscutting and Integrating Perspectives", "Transdisciplinarity and the Professions", "Institutionalizing of Inter- and Transdisciplinarity". The researchers focused on studying the typology of interdisciplinarity, the correlation of disciplinary and interdisciplinary approaches in the system of higher education, gave examples of methods and techniques teaching, characterized interdisciplinary curricula, analysed the involvement of interdisciplinarity in the teaching of humanitarian and technical disciplines, biology, mathematics, physics, etc.

In the 2000s, attempts to present the application of an interdisciplinary approach in practice also became widespread in the scientific discourse. The works of E.M. Amiri, E. Blankenship, C. Doumet-Serhal, A. Friedow, S. Gimatzidis, J. Green, L. Evis, N. Iqbal, K. Kopetzky, A. Kanmaz, Y. Karalı, N. Rekha, T. Spinde, W. Stroup, M. Sharma, M. Shukla and E. Spelt, C. Von Rüden, B. Weninger, Li Yu and others attract attention. There have also been thorough works that present the experience of the development and implementation of interdisciplinary education in higher educational institutions. For example, the practical guide L. De Greef, G. Post, C. Vink, and L. Wenting "Designing Interdisciplinary Education" (2017), presents the authors' twenty-year experience in teaching and learning at the University of Amsterdam using an interdisciplinary approach. The work also includes a literature review on the topic and examples of other interdisciplinary initiatives at the University of Amsterdam, Utrecht University, the University of Wageningen, the University of Leuphana, the University of Manchester, Imperial College London, University College London, the US-based Association for Interdisciplinary Studies, and many others. Researchers note that with the development of society and modern technologies, globalization processes cause the emergence of various issues that can be solved only with an interdisciplinary approach: "Now, more than ever, higher education is challenged to educate students to see beyond the limits of their own discipline and to come up with innovative integrated solutions to our contemporary problems" [15: 11]. The guide presents a "constructive alignment" experience (outcome-based, related to a constructivist understanding of learning) [15: 12], in which students are not passive individuals who simply absorb knowledge but actively learn by integrating new material with previous knowledge and experience. Teaching and learning are positioned as an interactive system of four components: 1) intended learning outcomes; 2) what the teacher does; 3) what the student does; 4) assessment of the educational process. Such a model "enables course and programme developers to align content, teaching and learning activities with the intended interdisciplinary learning outcomes. A correct match between these components helps to make the overall learning experience transparent and meaningful to students" [15: 12]. The authors conclude that using the approach is the basis of effective academic practice.

The reception of interdisciplinarity in the Ukrainian scientific discourse has been actualized since the 2010s. One of the works that present the reasoning for using the concept in the higher education system is I. Nechytailo's research "Interdisciplinarity as the basis of the development of a modern university and its educational programs" (2020). Among the factors that actualize using the approach, the author singles out problems "related to the health of the population, social inequality and discrimination, the ecological situation and many others, which cannot be grasped with the internal resources of one science (specialty, discipline)". The

modern labour market requires higher education institutions to educate specialists who "can balance at the intersection of various sciences (specialties, disciplines), see the situation comprehensively and multifaceted" [6: 370]. I. Nechytailo notes that it is the dominance of the competence approach in the modern education system that contributes to ensuring the "flexibility of graduates' professional trajectories". She emphasizes that in a modern Ukrainian university, the use of interdisciplinary ideas is not a "tribute to fashion", but an urgent need.

Works devoted to the specifics of the functioning of ideas of interdisciplinarity in the Ukrainian scientific discourse are important. In particular, O. Ahapova notes: "In the context of the integration of the Ukrainian research space into the European research space, it is worth paying special attention to multidisciplinary, interdisciplinary, and transdisciplinary research as key elements of scientific progress" [1: 34]. The author sees expediency in the active development of integration scientific projects, which have the following features: 1) research is carried out on the principle of combining two disciplines (the result is the formation of a new discipline); 2) research is conducted within the framework of several closely related disciplines, which involves extensive borrowing of concepts and methods; 3) research involves experts from different disciplines who work on a common complex problem, which "not only improves understanding but also supports actions to solve a common problem" [1: 35]. Similar ideas can also be traced in V. Zhelanova's study "Implementation of interdisciplinary strategies in modern higher education" (2021), which explains the increased attention to the approach "by socio-economic, innovative and educational transformations in the life of Ukraine, as well as globalization and European integration processes oriented towards the integration of our state with the world community, a new interpretation of education as a socio-cultural and axiological phenomenon, the transience and variability of modern society, which objectively cause changes in the development vectors of all branches of education in the direction of implementing the ideas of an interdisciplinary approach in the format of interdisciplinary integration" [2: 477]. The researcher gives an example of the effective application of the approach at the Department of Theory and History of Pedagogy of the Pedagogical Institute of Borys Grinchenko Kyiv University, where students of the second (master's) level of higher education are trained under the educational and professional program 011.00.01 "Pedagogy of the Higher Education".

V. Ohneviuk, O. Protsenko, and O. Melnychenko give their example of the practical application of the ideas of interdisciplinarity. They are convinced that the approach is relevant since it allows them to penetrate the essence of a particular phenomenon, "to look at it from different angles, to evaluate and analyse the received information objectively" [7: 3], which is extremely important in our time of increasing globalization processes. The authors emphasize that the main task of teachers is to select such connections between disciplines that "are capable of evoking higher-order thinking, rejecting weak connections that can provoke cognitive dissonance. Interdisciplinary research creates a more innovative and stimulating educational environment and introduces new ways of thinking and doing, defining the knowledge and competencies of each person" [7: 4]. The authors prove the effectiveness of the interdisciplinary approach in the professional training of higher education graduates of the educational program "Management of an Educational Institution" based on the experience of teaching the course "Educology" of the Borys Grinchenko Kyiv University as an interdisciplinary study subject. Interdisciplinarity was implemented through the integration of knowledge from the philosophy of education, history of education, educational policy, educational law,

management of education, economics of education, sociology of education, and cultural studies of education. The researchers state that the approach significantly expanded their scientific worldview and raised the level of methodological culture, contributing to the awareness of current problems in the field of education and the search for ways to solve them.

Conclusions and research perspectives. In the 70s of the XX century the understanding of the interdisciplinary approach and its implementation in scientific research and the education system intensified in the foreign scientific discourse. Scientists focused on the study of the theoretical dimension of the problem: developing a terminological apparatus, substantiating the perspective of applying the ideas of interdisciplinarity, developing a typology, distinguishing the advantages compared to a disciplinary approach, predicting prospects, etc. Considerable attention is also paid to the practical application of acquired knowledge: the development of programs and projects to solve urgent scientific and educational issues.

Since the 2010s, Ukrainian researchers in their investigations have increasingly turned to the development of models for the application of interdisciplinarity ideas in the education system, which is explained by the longing to improve the domestic educational process by appealing to the world tradition.

We see the prospect of further research in the study of promising interdisciplinary master's programs.

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Received: July 06, 2023
Accepted: August 03, 2023