



## VOCATIONAL EDUCATION

UDC 378.147: 7.05: 004.9

DOI <https://doi.org/10.5281/zenodo.17533021>

### Innovative educational practices in the professional training of designers for collaboration with other creative industries

**Halyna Marchyshak,**

Bachelor, Hair Stylist, <https://orcid.org/0009-0000-8304-7805>

**Accepted: 22.10.2025 | Published: 05.11.2025**

***Abstract.** The aim of the article is to identify key trends in innovation in the field of design education and assess their potential for interdisciplinary collaboration in the context of the development of the creative economy. The study is aimed at identifying effective pedagogical models that contribute to the formation of future designers' ability to engage in joint creative activity in a multidisciplinary environment. **Methods.** The methodological basis of the study is the systemic, competency-based, comparative and structural-functional approaches, which provided the possibility of a holistic analysis of the theoretical and methodological foundations of professional training of designers. The methods of content analysis of scientific sources, comparative analysis of international and national educational practices, as well as generalization of the results of research by leading universities in the world (MIT, Central Saint Martins, Parsons School of Design) on the implementation of innovative forms of training in the training of designers were used. **Results.** The main results of the study are that the leading innovative trends in design education have been identified, including: project-team learning, design*



*thinking, the use of digital and VR/AR technologies, interdisciplinary laboratories, gamification, and an orientation towards inclusivity and sustainability in design. Their potential for interdisciplinary collaboration has been analyzed and the specifics of implementation in the Ukrainian educational context have been outlined. The results prove that the most effective for the development of interdisciplinary competencies are the integration-interdisciplinary, project-oriented, and design thinking approaches, which contribute to the formation of specialists capable of combining technological, creative, and social aspects of design. **Conclusions.** The practical significance of the results obtained lies in the development of recommendations for improving the content and methodology of professional training of designers. The integration of interdisciplinary modules and cross-disciplinary projects into curricula, the development of creative laboratories, the introduction of digital tools, and the active involvement of industry representatives in the educational process are proposed. The implementation of these recommendations will contribute to increasing the level of readiness of graduates for joint creative activity in the conditions of the creative economy and strengthening the connection between education, business, and cultural sectors.*

**Keywords:** *design education, innovation trends, design thinking, digital technologies, project-team learning.*

## **Інноваційні освітні практики у професійній підготовці дизайнерів для колаборації з іншими креативними індустріями**

**Марчишак Галина Петрівна,**

бакалавр, перукар, <https://orcid.org/0009-0000-8304-7805>

**Анотація.** *Метою статті є визначення інноваційних тенденцій у сфері дизайнерської освіти та оцінка їхнього потенціалу для міжгалузевої*



колаборації в контексті розвитку креативної економіки. Дослідження спрямоване на виявлення ефективних педагогічних моделей, що сприяють формуванню в майбутніх дизайнерів здатності до спільної творчої діяльності в мультидисциплінарному середовищі. **Методи.** Методологічну основу дослідження становлять системний, компетентнісний, порівняльний і структурно-функціональний підходи, які забезпечують можливість цілісного аналізу теоретико-методологічних засад професійної підготовки дизайнерів. Використано методи контент-аналізу наукових джерел, порівняльного аналізу міжнародних і національних освітніх практик, а також узагальнення результатів досліджень провідних університетів світу (MIT, Central Saint Martins, Parsons School of Design) з метою впровадження інноваційних форм навчання у процес підготовки дизайнерів. **Результати.** Встановлено провідні інноваційні підходи у дизайнерській освіті, що включають проєктно-командне навчання, дизайн-мислення, використання цифрових і VR/AR-технологій, кросдисциплінарні лабораторії, гейміфікацію та орієнтацію на інклюзивність і стійкість у дизайні. Проаналізовано їхній потенціал для міжгалузевої колаборації та окреслено специфіку впровадження їх в український освітній контекст. Результати доводять, що найбільш ефективними для розвитку міждисциплінарних компетентностей є інтеграційно-міждисциплінарний, проєктно-орієнтований і дизайн-мисленнєвий підходи, які сприяють формуванню фахівців, здатних поєднувати технологічні, креативні та соціальні аспекти проєктування. **Висновки.** Практична значимість отриманих результатів полягає в розробленні рекомендацій щодо вдосконалення змісту й методики професійної підготовки дизайнерів. Запропоновано інтеграцію міждисциплінарних модулів і кросдисциплінарних проєктів у навчальні програми, розвиток креативних лабораторій, упровадження цифрових інструментів та активне залучення представників індустрії до освітнього процесу. Реалізація цих рекомендацій сприятиме



*підвищенню рівня готовності випускників до спільної творчої діяльності в умовах креативної економіки та зміцненню зв'язку між освітою, бізнесом і культурними секторами.*

*Ключові слова: дизайнерська освіта, інноваційні тенденції, дизайн-мислення, цифрові технології, проєктно-командне навчання.*

**Problem statement.** The modern era of rapid technological and cultural transformations presents new requirements for the professional training of designers, which can no longer be limited to the development of artistic and aesthetic, or technical competencies. Design is increasingly viewed as an interdisciplinary field that functions at the intersection of art, technology, business, media, architecture, and cultural practices. In this context, collaboration between designers and representatives of other creative industries is becoming a necessary condition for successful professional activity and the development of innovative products that meet market and societal needs. Despite the apparent relevance of interdisciplinary interaction in the field of design, the system of professional education in Ukraine and many other countries still retains fragmentation and insufficient integration of educational programs. Traditional educational models are primarily focused on the development of narrowly professional skills, while the formation of collective creativity, project thinking, communication flexibility, and digital literacy skills is often overlooked. It leads to a gap between the academic training of future designers and the real demands of the modern creative economy.

The problem is compounded by the fact that educational institutions do not sufficiently utilise innovative methods, such as project-based team learning, design thinking, digital laboratories, gamification, interdisciplinary workshops, and virtual collaborative platforms. The lack of a systematic approach to integrating these practices into the educational process hinders the development of students' ability to effectively collaborate with specialists in related fields, such as IT, marketing,



cinema, or fashion. Therefore, a scientific and practical problem arises: to determine which innovative educational practices are most effective in developing the collaborative potential of designers and how they can be adapted to the Ukrainian educational space, taking into account European trends in the field of creative education.

**Analysis of recent research and publications.** A review of scientific publications devoted to innovations in design education indicates a gradual shift in emphasis from traditional academic approaches to integrated learning models based on creativity, interdisciplinarity and practical interaction. Thus, in the work of J. Wang and H. Wang [1] substantiated that the development of innovative thinking in design students is a key factor in their professional self-realisation within the context of the creative economy. The authors established that the combination of elements of creative autonomy with institutional support for entrepreneurial culture contributes to the development of students' readiness for independent decision-making, the generation of non-standard ideas, and their implementation in real projects. The results obtained demonstrate that an effective system of design education should not only transfer technical skills, but also foster critical and systemic thinking as the foundation of innovative activity.

The study by S. Obeid and H. Demirkan [2] demonstrates that the introduction of virtual reality into basic design studios radically expands the possibilities for creative thinking and visual experimentation. Based on empirical analysis, the authors concluded that the use of VR technologies contributes to the development of spatial perception, flexibility of thinking and the ability to interdisciplinary integration – in particular, between design, architecture and digital media. At the same time, it is noted that to achieve maximum effect, adaptation of pedagogical methods and creation of technologically equipped learning environments are necessary.



A significant contribution to the understanding of collaboration mechanisms was made by S. Leem and S. W. Lee [3], who focused on the role of design thinking in facilitating interaction between representatives of different educational areas. The results of their study showed that design thinking is not only a method for solving complex problems, but also a tool for building a shared creative space, where students learn to coordinate their actions, exchange ideas, and synthesise knowledge from different fields. The authors emphasised that such an interactive model of education forms the basis for sustainable interdisciplinary cooperation, particularly in the fields of marketing, IT, urban planning, and cultural management.

The work of T. Kee et al. [4] considered the combination of design thinking principles with project-based learning in the post-pandemic period. The authors proved that it is such integration that makes it possible to adapt the educational process to the «new reality», where digital communications, remote interaction and flexible teams dominate. The results of the study show that the use of interdisciplinary projects contributes to increasing students' creativity levels, their ability to think collectively, and their capacity to solve real socio-economic problems in cooperation with business and technology companies.

In the work of S. Zha et al. [5], a conceptual model of a cross-disciplinary design workshop is proposed, catalysing creative interaction among specialists from different industries. The authors demonstrated that effective interdisciplinary collaboration necessitates not only a shared space but also a clear structure of interaction, where the roles of participants, stages of prototyping, and mechanisms of collective decision-making are defined. This model has demonstrated its effectiveness in international educational projects focused on developing innovative products in the fields of sustainable design and digital art.

The experience of integrating design thinking into business education is highlighted in the work of C. Cummings and J. Yur-Austin [6]. Based on an analysis of MBA case studies, the authors found that combining design thinking with project-



based learning methods enhances students' ability to solve problems in a socially oriented manner and strengthens the connection between education and community needs. The researchers note that such a model contributes to the development of skills in strategic vision, adaptability, and team creativity – precisely those competencies that are becoming increasingly decisive in the global creative economy.

Further development of research in this area is presented in the work of J. E. McLaughlin et al. [7], which, based on a comparative analysis of educational programs of four universities, shows that design thinking is becoming a central element of the transformation of higher education. At the same time, the authors demonstrate that the introduction of design thinking as an educational paradigm alters the nature of educational interaction between students and teachers, creating conditions for independent problem-solving, empathetic understanding of user needs, and team synthesis of ideas. The study's results confirmed that this model fosters a deeper understanding of the social context of creative activity among students and develops their ability to communicate effectively in multidisciplinary teams.

Analysis of the results of the meta-research conducted by L. Zhang and Y. Ma [8] demonstrates the systemic positive impact of project-based learning on the quality of knowledge acquisition and the development of students' creative competencies. The authors, having summarised a large number of empirical studies, concluded that educational models built around real projects provide sustainable results in the development of critical thinking skills, an innovative approach to problem-solving, and professional independence. At the same time, it was emphasised that it is the multidimensional structure of projects, which combines social, technological and aesthetic aspects, that most contributes to interdisciplinary collaboration and the development of integrative thinking.



The study by Z. Ying [9] complements the understanding of internal motivational mechanisms within project-based learning. The author found that students' participation in projects increases their internal motivation to learn, since the activity acquires practical significance and promotes self-identification through the result. It enables the consideration of project methods not only as a pedagogical technology, but also as a tool for shaping the subjectivity of students capable of autonomous professional activity and creative interaction with representatives of other fields. In turn, V. Bilana [10] with co-authors proved that the effectiveness of project-based learning largely depends on the integrity of its project design and the gradual integration of theory and practice. The results obtained confirm that the combination of the project approach with elements of design thinking can serve as the basis for creating interdisciplinary educational programs that train specialists capable of interacting across various segments of the creative industries.

**Highlighting previously unresolved parts of the general problem.**

Generalising the results of the above studies provides grounds to assert that the scientific discourse on innovations in design education is focused on integrating technological solutions, interdisciplinary thinking, and practice-oriented learning models. At the same time, the problem of systematically implementing these approaches in the domestic educational space remains insufficiently studied, as does the issue of developing effective mechanisms for interdisciplinary collaboration between design schools, businesses, and cultural institutions. It is these aspects that constitute the research focus of the proposed work.

**Formulation of the article objectives (statement of the task).** This article aims to substantiate effective and innovative educational practices that foster future designers' competencies in collaboration with representatives of other creative industries, as well as to develop conceptual approaches to integrating interdisciplinary interaction into the educational processes of higher education institutions (HEIs).



To achieve the goal, the article sets the following tasks: to analyze modern scientific approaches to the professional training of designers in the context of the development of creative industries; to identify the main trends of innovation in the field of design education and assess their potential for interdisciplinary collaboration; to formulate recommendations for improving the content and methods of professional training of designers to increase their level of readiness for joint creative activity within the creative economy.

**Presentation of the main material of the study.** Professional training of designers in modern conditions goes far beyond traditional artistic and technical training. The development of creative industries, digitalisation, and the growth of interdisciplinary ties necessitate the formation of complex competencies in future specialists, encompassing analytical thinking, creativity, communication skills, digital literacy, and the ability to work in teams [5]. In this context, analysing modern scientific approaches to the professional training of designers is essential, as it enables us to determine which pedagogical models most effectively contribute to the development of collaborative potential and the integration of design activities with other sectors of the creative economy.

The study of theoretical and methodological approaches reveals a significant transformation of the training system for designers in the direction of interdisciplinarity, innovation, and practical orientation (table 1).

**Table 1**

*Theoretical and methodological approaches to the professional training of designers in the context of creative industries*

Approach	Essence	Distribution in modern design education	Promoting interdisciplinary collaboration	Adaptation to Ukrainian conditions
Competence-based	Focusing on the formation of a complex of professional, communicative and creative competencies,	Widely used in European and national educational standards	Provides a basic level of readiness for cooperation,	Requires updating the content of educational programs in



Approach	Essence	Distribution in modern design education	Promoting interdisciplinary collaboration	Adaptation to Ukrainian conditions
Integrative-interdisciplinary	developing the ability to make independent decisions and think critically		especially in team projects	accordance with the requirements of the creative economy
	Combining design with IT, marketing, architecture, and cultural studies, developing the ability to work in multidisciplinary teams	Implemented at leading universities in the world (MIT, Central Saint Martins)	Creates a basis for collaboration with other creative industries	Need to expand partnerships between educational institutions and businesses
Project-oriented	Learning through the creation of real or simulated projects, teamwork and mutual evaluation of results	One of the key elements in the practice of design education at leading schools in the world	Develops practical skills of cooperation, time and resource management	It is worth strengthening cooperation with employers to implement educational projects
Design thinking	Based on empathy, creativity, prototyping and testing, contributes to the generation of innovative solutions	Intensively used in innovation centres and creative laboratories	Promotes joint problem-solving and product creation at the intersection of industries	Requires training of teachers and creation of creative spaces in HEIs
Digital	Use of digital technologies (VR/AR, 3D modeling, UX/UI, AI) in the educational process	Rapidly developing in global practice, but limitedly implemented in Ukraine	Opens up new formats of interaction with IT and media	Necessary investments in digital infrastructure and modern equipment
Cultural and creative-economic	Focus on forming an understanding of design as an element of cultural policy and economic development	Presented in most humanitarian design education programs	Promotes the development of identity and cultural integration in joint projects	Requires broader consideration of regional and national contexts

Source: compiled by the author based on [6, p. 129; 7]

Summarising the above, the most significant potential for the development of interdisciplinary interaction lies in the integration of interdisciplinary, project-oriented, and design-thinking approaches. They develop in students the ability to work in dynamic teams, combining artistic, technological, and analytical knowledge.



At the same time, domestic design education requires further adaptation of these models, particularly through the modernisation of curricula, digitalisation of the educational environment, and expansion of partnerships with representatives of the creative industries. Traditional educational models, which focus mainly on the development of artistic and technical skills, are no longer able to ensure the effective integration of specialists into modern creative industries. In view of this, innovative educational practices are becoming increasingly critical for the formation of competitive designers capable of adapting to rapidly changing labour market conditions, implementing interdisciplinary projects, and working together with representatives of other creative fields [8]. Innovations in design education not only improve the quality of the educational process but also create the prerequisites for the development of interdisciplinary competencies in students, as modern projects often require the integration of knowledge and skills from marketing, information technology, media, fashion, architecture, and the film industry.

One of the most significant trends in modern design education is project-based learning. This approach involves involving students in real or simulated projects, during which they can simultaneously develop professional skills, learn to work in a team, and effectively integrate knowledge from different disciplines. Project-based learning contributes to the development of practical competencies necessary for interdisciplinary interaction, as such projects often involve the participation of business partners, cultural and technological companies, creating real conditions for collaboration and the interdisciplinary exchange of experiences.

An equally important trend is the use of the design thinking methodology, which is based on empathy, iterative prototyping and testing of solutions. This approach fosters the development of creative and critical thinking in students, enabling them to effectively address problems that arise at the intersection of various creative industries. Design thinking not only forms the ability to generate innovative ideas but also enhances team interaction skills, which is especially important in the



implementation of complex projects, where design serves as a mediator between technology, business, and cultural practices.

Modern trends also demonstrate the widespread adoption of digital technologies and VR/AR platforms in the design training process. The use of virtual and augmented reality, 3D modelling, interactive learning platforms, and artificial intelligence tools opens up new learning formats, allowing students to expand the boundaries of their professional activities [9]. The use of digital technologies not only contributes to the development of technical competencies, but also creates conditions for remote and international collaboration, integrating designers with the IT, media and gaming industries, which provides practical training for participation in global projects.

Cross-disciplinary workshops and laboratories are another critical innovative practice in modern design education. The creation of specialised learning spaces where students from different disciplines work together on projects enables the development of interdisciplinary competencies, practical communication skills, and the ability to think creatively in collaboration. Such practices stimulate the integration of knowledge from marketing, technology, cultural studies and other fields, which significantly increases the readiness of future designers to interact in multidisciplinary teams and implement complex innovative projects.

Gamification of the educational process also plays an essential role in the development of innovative design education. The use of game mechanics, simulations, and interactive tasks helps increase student motivation, develop soft skills, and foster teamwork skills. Gamification helps to create an environment where students actively interact in project groups, experiment with different approaches to solving problems and develop interdisciplinary collaboration skills. Finally, modern educational practices are increasingly focused on inclusiveness and sustainability in design. Developing students' ability to consider socio-cultural, physical, and environmental aspects of design contributes to the development of a



responsible and conscious approach to creative activity. Inclusive and sustainable projects enable students to participate in global creative initiatives, create products that consider diverse contexts and user needs, and actively engage with representatives of other creative fields in collaborative design solutions [10]. As we can see, the analysis of current trends in design education demonstrates that the most effective approaches are those that combine project-based learning, design thinking, digital technologies and cross-disciplinary practices. They ensure the comprehensive development of students' professional, communication, and creative competencies, creating the prerequisites for successful interdisciplinary collaboration, which is critically essential for the modern development of creative industries in both global and local contexts.

Particular attention should be paid to industries that are on the border between art and applied design, particularly hairdressing, which is increasingly integrated into the sphere of creative industries [11]. Modern trends demonstrate that the professional activities of hairdressers and makeup artists are no longer limited to technical skills, but involve mastering the design elements of form, colour, style, and visual composition, which combine this profession with fashion, graphic, and industrial design [12]. In this context, it is essential to develop in the future specialists' ability to creatively interpret a person's image as a design object, as well as to collaborate with representatives of related industries, such as stylists, photographers, fashion designers, and directors. The inclusion of hairdressing in the structure of design education will contribute to the development of interdisciplinary competencies, particularly the understanding of space, texture, colour, and material, which are fundamental to all types of design. A hairdresser who thinks like a designer is able not only to fulfil orders, but also to create new stylistic concepts that shape the cultural codes of the time. Therefore, integrating hair design elements into the curricula of design specialities, such as the courses «Visual Style and Fashion»,



«Aesthetics of Image», or «Creative Technologies of Personal Design», is a promising direction for the development of modern professional education.

Thus, the modern system of design education is at the stage of active rethinking of content and methodological principles. The introduction of innovative approaches not only contributes to the development of professional competencies but also opens up numerous opportunities for interdisciplinary integration. In this context, it is advisable to analyse the potential of each of the considered trends for collaboration with other creative sectors, taking into account the realities of the Ukrainian educational space, the level of digital infrastructure, the presence of partnerships with business and cultural institutions, as well as the readiness of educational institutions to implement new learning formats (table 2).

**Table 2**

*Analysis of the potential of innovative educational trends in training designers for interdisciplinary collaboration*

<b>Innovative educational methodology</b>	<b>Industries for integration</b>	<b>Implementation potential</b>	<b>Main obstacles to implementation</b>	<b>Paths of interdisciplinary collaboration</b>
Project-team learning	Marketing, architecture, IT, urbanism, creative management	High – in the presence of partnerships with business, municipalities, and design studios	Insufficient coordination between educational institutions and industry; limited funding for real projects	Allows students to work in teams on real tasks together with specialists from different industries
Design thinking	Marketing, social communications, and education	Medium – the methodology is actively implemented in creative universities and IT schools	Lack of trained teachers, a formal application without real practice	Promotes the development of cross-disciplinary thinking and co-creation skills
Digital and VR/AR technologies	IT, movie, media, architecture, industrial design	Growing – digital laboratories are being created in	High cost of equipment, insufficient level of technical training of students	Provides conditions for international and remote cooperation



		leading universities		
Cross-disciplinary workshops and laboratories	Business, marketing, engineering, fashion, ecological design	High – possible within grant programs and partnership projects	Lacks a sustainable system of interfaculty interaction; limited resources	Promotes the formation of interdisciplinary teams and the development of communication skills
Gamification of the educational process	IT, media, education, psychology, management	Medium – used in selective courses, mainly experimentally	Insufficient digitalisation of the educational environment, resistance to traditional methods	Increases motivation, develops team interaction skills
Inclusivity and sustainability in design	Sociology, ecology, urbanism, cultural studies	Growing – is being updated in the context of socially responsible practices	Lack of systemic methodology and national standards in the field of sustainable design	Ensures participation in international creative projects and socially significant initiatives

Source: compiled by the author based on [13; 14; 15; 16; 17]

Based on an analysis of theoretical and methodological approaches and practices, as well as consideration of the identified opportunities and obstacles to implementing innovations in domestic design education, a set of recommendations has been proposed to enhance the content and methodology of professional designer training. It is necessary to review and modernise curricula to integrate interdisciplinary modules and project-oriented practices as fundamental components of training. The content of educational disciplines should combine fundamental artistic and technical competencies with courses in design thinking, project management, IT technology bases and elements of creative entrepreneurship. It is advisable to introduce modules focused on working in multidisciplinary teams (for example, «Design in Creative Industries» and «Collaborative Projects: Design + Business + Technology»), which should be mandatory components of both bachelor's and master's programs.



It is advisable to shift the methodological paradigm towards project-oriented and problem-oriented learning with the active use of design thinking. It refers to the systematic use of long-term team projects that simulate real work processes, involve collaboration with clients/stakeholders, and include several iterations of prototyping and testing. Such an organisation of training should ensure inter-faculty connections and the involvement of experts from other fields, including marketing, IT, media, culture, and management. It is necessary to introduce and systematically develop the infrastructure of cross-disciplinary laboratories and creative hubs at HEIs. These environments should be equipped with both technical means (VR/AR stations, 3D printers, and studio equipment for multimedia) and organisational tools (industry partnership mechanisms, stands for pilot projects, and platforms for remote collaboration). Investments in such infrastructure should combine internal university resources, grant programs, and industrial partnerships.

**Conclusions.** The study provided an opportunity to conduct a comprehensive analysis of modern scientific approaches and innovative trends in the field of professional training of designers in the context of the development of creative industries. As a result, it was found that the modernisation of design education is a key factor in the formation of a new generation of specialists capable of operating effectively in the conditions of a global creative economy, where success is determined not only by artistic or technical abilities, but also by the ability to cooperate in an interdisciplinary cooperation, digital adaptability, and strategic thinking.

The analysis of theoretical and methodological approaches has shown that the most effective models of training designers are integrative-interdisciplinary, project-oriented, competency-based, and design-thinking approaches, which provide a combination of theoretical knowledge, practical skills, and creative skills. It is these competencies that enable students to work in multidisciplinary teams, combine knowledge from different disciplines, and create innovative products at the



intersection of art, technology, and business. It was found that the key trends of innovation in design education – project-based team learning, the use of design thinking, the introduction of digital and VR/AR technologies, as well as the development of cross-disciplinary laboratories, gamification and an orientation towards inclusiveness and sustainability – have significant potential for interdisciplinary collaboration, contribute to the formation of flexible, mobile, socially responsible specialists capable of working in conditions of constant technological and cultural changes. At the same time, the most significant effect is observed in learning models that combine project activities with digital tools, creating real conditions for students to interact with representatives of various creative industries and focusing on solving socially significant problems. At the same time, the analysis results revealed several limitations in the domestic system of training designers, including insufficient digitalisation of the educational environment, limited partnerships between universities and industry, and the lack of a well-developed infrastructure for cross-disciplinary laboratories. It requires a targeted educational policy that involves updating curricula, creating integrated educational and practical platforms, and stimulating cooperation between educational institutions, business, and cultural institutions.

Thus, the professional training of designers should shift from the paradigm of individual creative development to a model of collaborative, innovative learning, in which interdisciplinarity, practical orientation, digital integration, and social responsibility will prevail. The implementation of the proposed recommendations will not only contribute to improving the quality of design education but also enhance the overall quality of the design process. Still, it will also help ensure the formation of a new type of specialist – a creative integrator, capable of combining art, technology and business in a single innovative space. It will also become a decisive factor in the development of Ukrainian creative industries and their integration into the global cultural and economic space.



## References

1. Wang J., Wang H. Cultivation of innovative thinking and career development in design education. *Humanities and Social Sciences Communications*. 2025. Vol. 12. 1390. DOI: <https://doi.org/10.1057/s41599-025-05754-3>.
2. Obeid S., Demirkan H. The influence of virtual reality on design process creativity in basic design studios. *Interactive Learning Environments*. 2023. Vol. 31, № 4. P. 1841–1859. DOI: <https://doi.org/10.1080/10494820.2020.1858116>.
3. Leem S., Lee S. W. Fostering collaboration and interactions: Unveiling the design thinking process in interdisciplinary education. *Thinking Skills and Creativity*. 2024. Vol. 52. 101520. DOI: <https://doi.org/10.1016/j.tsc.2024.101520>.
4. Kee T., Kuys B., King R. B. Foregrounding design thinking in project-based learning amid the transition to the new normal. *IU Libraries Journals*. 2025. Vol. 19, № 1. DOI: <https://doi.org/10.14434/ijpbl.v19i1.34520>.
5. Zha S., Zhao D., Li M., Gong W., Hu Q., Li Z. Collaborative catalysts: a framework for creative interdisciplinary design workshop. *IASDR 2023: Life-Changing Design* / eds D. De Sainz Molestina, L. Galluzzo, F. Rizzo, Spallazzo D. 2023. DOI: <https://doi.org/10.21606/iasdr.2023.550>.
6. Cummings C., Yur-Austin J. Design thinking and community impact: A case study of project-based learning in an MBA capstone course. *Journal of Education for Business*. 2022. Vol. 97, № 2. P. 126–132. DOI: <https://doi.org/10.1080/08832323.2021.1887795>.
7. McLaughlin J. E., Chen E., Lake D., Guo W., Skywark E. R., Chernik A. (Designthinking teaching and learning in higher education:Experiences across four universities. *PLoS ONE*. 2022. Vol. 17, № 3. e0265902. DOI: <https://doi.org/10.1371/journal.pone.0265902>.



8. Zhang L., Ma Y. A study of the impact of project-based learning on student learning effects: a meta-analysis study. *Frontiers in Psychology*. 2023. Vol. 14. 1202728. DOI: <https://doi.org/10.3389/fpsyg.2023.1202728>.

9. Ying Z. A study on the influence of project-based teaching on the intrinsic motivation of private university students' English learning. *Journal of Science Education*. 2022. Vol. 13. P. 29–31. DOI: <https://doi.org/10.16400/j.cnki.kjdk.2022.13.010>.

10. Bilana V., Hromadskyi R., Zavadzka G. Suslenska O., Yalokha T. The role of innovative educational technologies in the training of specialists in the field of culture and arts: European experience. *Multidisciplinary Reviews*. 2023. Vol. 6. 2023spe002. DOI: <https://doi.org/0.31893/multirev.2023spe002>.

11. Свінцицька О. М., Ткачук В. О. Креативна економіка та креативні індустрії: навч. посібн. Житомир: Державний університет «Житомирська політехніка», 2020. 218 с. URL: <https://files.znu.edu.ua/files/Bibliobooks/Inshi71/0051578.pdf> (date access: 12.08.2025).

12. Тадля О. М. Культурні і креативні індустрії в закладах вищої освіти України: сучасні тенденції та перспективи розвитку. *Вісник Національної академії керівних кадрів культури і мистецтв: наук. журнал*. 2024. № 4. С. 98–105. DOI: <https://doi.org/10.32461/2226-3209.4.2024.322815>.

13. Clinton G., Hokanson B. Creativity in the training and practice of instructional designers: The design/creativity loops model. *Educational Technology Research and Development*. 2012. Vol. 60. P. 111–130. DOI: <https://doi.org/10.1007/s11423-011-9216-3>.

14. Al-Ansi A. M., Jaboob M., Garad A., Al-Ansi A. Analyzing augmented reality (AR) and virtual reality (VR) recent development in education. *Social Sciences & Humanities Open*. 2023. Vol. 8, № 1. 100532. DOI: <https://doi.org/10.1016/j.ssaho.2023.100532>.



15. Adiyono A., Hayat E. W., Oktavia E. D., Prasetyo N. T. Learning interaction in the digital era: technological innovations and education management strategies to enhance student engagement. *Journal of Research in Instruction*. 2024. Vol. 4, № 1. P. 205–221. DOI: <https://doi.org/10.30862/jri.v4i1.333>.

16. Alifteria F. A., Prastowo T., Suprpto N. Analysis of students' critical thinking skills on virtual reality learning media. *Journal of Recent Educational Research*. 2023. Vol. 4 (1). P. 59–67. DOI: <https://doi.org/10.46245/ijorer.v4i1.275>.

17. Baxter G., Hainey T. Using immersive technologies to enhance the student learning experience. *Interactive Technology and Smart Education*. 2024. Vol. 21, № 3, P. 403–425. DOI: <https://doi.org/10.1108/ITSE-05-2023-0078>.