ПЕДАГОГІЧНА АКАДЕМІЯ:
НАУКОВІ ЗАПИСКИ

**Theory and methodology of teaching**

**UDK 378.147 : 81'243] + 001.895 (045)**

**DOI https://doi.org/10.5281/zenodo.17111516**

# Електронне інноваційне портфоліо як засіб вимірювання рівня сформованості інноваційної компетентності здобувачів вищої освіти

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**Прийнято: 02.09.2025 | Опубліковано: 13.09.2025**

***Анотація***. *У статті всебічно проаналізовано різні аспекти проблеми інноваційної компетентності здобувачів вищої освіти. Зроблено огляд основних державних та інституціональних документів із зазначеної проблеми: законів, кодексів, положень, листів, методичних рекомендацій тощо. На основі*

*публікацій вітчизняних та закордонних науковців визначено їхні погляди щодо актуальності та сутності проблеми формування інноваційної компетентності студентів й зроблено висновок про її актуальність та доцільність наукової розвідки. При цьому огляд наукових статей за останні п'ять років дозволив констатувати, що недостатньо вивченою залишилася проблема вимірювання рівня сформованості інноваційної компетентності, що негативно впливає на перебіг її формування на всіх рівнях вищої освіти.* ***Метою*** *дослідження є обґрунтування* структури та змісту такого засобу самоконтролю *рівня сформованості інноваційної компетентності в освіті, а саме у навчанні іноземних мов і культур, як електронне інноваційне портфоліо, з урахуванням конкретизованих нами теоретичних передумов укладання зазначеного засобу навчання (структури та змісту інноваційної компетентності). Для досягнення поставленої мети були використані такі* ***методи*** *дослідження: аналіз і синтез сучасних даних про ступінь розробленості проблеми формування інноваційної компетентності в Україні та за кордоном загалом і структури зазначеної компетентності зокрема; усні опитування здобувачів вищої освіти з метою вивчення їхнього ставлення до проблеми впровадження інновацій в освітній процес; узагальнення виявлених думок студентів бакалаврату, магістратури та аспірантури; наукове спостереження процесу підготовки кваліфікаційних робіт здобувачами вищої освіти та їх перевірки на інноваційність; порівняльний аналіз видів інновацій у публікаціях здобувачів вищої освіти.* ***Результатами*** *дослідження є: введення в науковий обіг терміну «електронне інноваційне портфоліо» (пакет електронних документів, за допомогою яких здобувачі освіти визначають та відображають свої досягнення і досвід оволодіння інноваційною компетентністю); опис його структури та змісту; створення шкали та критеріїв самооцінювання рівня сформованості інноваційної компетентності здобувачів освіти у сфері оволодіння іноземними мовами і культурами. У* ***висновках*** *констатується, що електронне інноваційне*


ISSN: 2786-9458

*портфоліо є ефективним засобом контролю та моніторингу рівня сформованості інноваційної компетентності здобувачів освіти в галузі навчання іноземних мов і культур і рекомендується для використання в освітньому процесі.*

***Ключові слова:*** *інноваційна компетентність, електронне інноваційне портфоліо, вимірювання, контроль, самоконтроль, рівень сформованості, іноземні мови і культури, здобувачі вищої освіти; знання, уміння, комунікація, відповідальність, автономія.*

## Electronic Innovation Portfolio as a Tool for Measuring the Level of Formation Higher Education Students' Innovation Competence

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***Abstract.*** *The article examines various aspects of innovation competence among higher education students. A review is conducted of key national and institutional documents related to the topic, including laws, codes, regulations, official letters, and*

*methodological recommendations. Based on publications by domestic and foreign scholars, their perspectives on the relevance and essence of developing students' innovation competence are identified. It allowed us to conclude that this issue is both timely and worthy of further investigation. A review of academic articles from the last five years reveals that the problem of measuring the level of innovation competence development remains insufficiently studied, which negatively impacts the formation of this competence at all levels of higher education. The study* ***aims*** *to substantiate the structure and content of a self-assessment tool for measuring the level of innovation competence in education, specifically in the field of foreign language and culture teaching, as an electronic innovation portfolio. The choice of the tool is based on theoretical foundations specified by the authors (namely, the structure and content of innovation competence). The following* ***research methods*** *were employed: analysis and synthesis of current data on the development of innovation competence in Ukraine and abroad; oral surveys of higher education students to explore their views on the implementation of innovations in the educational process; generalization of opinions gathered from bachelor's, master's, and PhD students; scientific observation of the process of preparing and evaluating students' qualification papers for their level of innovation; and comparative analysis of types of innovations presented in students' academic publications.* ***The results*** *of the study are: introduction of the term 'electronic innovation portfolio' into academic discourse (defined as a set of electronic documents that allow students to identify and reflect on their achievements and experience in acquiring innovation competence); description of the portfolio's structure and content; development of the scale and criteria for self-assessing the level of innovation competence in the field of foreign language and culture acquisition.* ***The conclusions*** *state that the electronic innovation portfolio is an effective tool for monitoring and measuring the level of formation learners' innovation competence in the field of foreign language and culture acquisition. It is recommended for implementation in the educational process.*

***Keywords:*** *innovation competence, electronic innovation portfolio, measurement, monitoring, self-assessment, level of development, foreign languages and cultures, higher education students, knowledge, skills, communication, responsibility, autonomy.*

«Innovation competence has been viewed from many different angles by different scholars. … Given the many perspectives on what innovation competence is and can be, there is little consensus on its definition and meaning».

R. Ovbiagbonhia, 2021

*https://research.hanze.nl/ws/portalfiles/portal/70564029/Ovbiagbonhia_complete_wres.pdf*

**Problem Statement.** One of the most pressing issues in both domestic and foreign contemporary science is the formation of innovative competence (IC) in various fields of activity, including education. The relevance of this problem is evidenced by multiple state and institutional documents (laws, codes, regulations, letters, methodological recommendations, etc.). The main ones are the Law of Ukraine "On Innovative Activity" No. 2849-IX dated 12.13.2022 (https://zakon.rada.gov.ua/laws/show/40-15#Text) and the Order of the Ministry of Education and Science of Ukraine dated 05.12.2023 No. 552 "Regulations on the Procedure for Implementing Innovative Activity in the Field of Education" (https://mon.gov.ua › mon › sites › 2023/01/02).

Taking into account the above documents, this issue was actively researched by domestic scientists. It's important to highlight that significant progress has been achieved by researchers from abroad. A review of scientific publications over the past five years allows us to state that such issues as the essence of IC, its structure and content, and the features of IC in various spheres of human activity, including education, have been comprehensively studied and described. However, insufficient

attention has been paid to the measurement, self-assessment, and monitoring of the level of higher education students' IC development, as well as the tools used for these purposes. Therefore, we believe these aspects require further investigation. This article focuses specifically on measuring the level of university students' innovation competence formation**.**

**Analysis of Recent Research and Publications.** The problem of developing innovation competence has remained relevant for many years. Foundational international studies began appearing as early as the 1980s (e.g., T. M. Amabile, *A model of creativity and innovation in organizations*, 1988). Researchers such as J. Higgins, M. West, G. Cerinsek, S. Dolinsek, F. Zhang, A. Kolmos, E. de Graaff, C. H. Wang, L. M. Hero, E. Lindfors, V. Taatila, N. Bozic, C. Richardson, P. Mishra, F. Fernández-Cruz, F. Rodríguez-Legendre, and S. Vincent-Lancrin, among others, have made significant contributions to the study of IC formation.

Ukrainian researchers have also paid considerable attention to the issue of innovation competence, both in general and in the educational sphere in particular. For instance, O. Kyriyenko [1] distinguishes several stages in the development of the innovation process in education: Stage I (from Antiquity to the 1930s), Stage II (1930s – mid-1950s), Stage III (mid-1950s – 1970s), Stage IV (1980s – 1990s), Stage V (1990s – 21st century). Over these periods, a significant amount of scientific research has been carried out. A review of publications on the problem shows that a broad range of issues have been addressed, including: philosophical foundations (I. Zyazyun, O. Ivanova, O. Ostapchuk, etc.), psychological foundations (I. Bekh, T. Galtseva, S. Lubyanska, etc.), pedagogical foundations (A. Virkovsky, I. Dychkivska, O. Dubasenyuk, N. Efremenkova, O. Kozlova, K. Makogon, etc.), historical foundations (I. Anosov, etc.), socio-cultural foundations (I. Gavrish, M. Romanenko, etc.) and subject-methodological foundations (O. Dubasiuk, O. Kovalchuk, I. Mankus, L. Melnyk, I. Skomorowa, etc.). During the fifth stage, the concept of 'innovative competence' was introduced into scientific circulation. Over the past five years, this

issue has been studied, for example, by such domestic researchers as L. Stefan, V. Tyurina, V. Danchenko, I. Ventseva, N. Karapetrova, O. Burchak, L. Kyrylenko, A. Skorolitnaya, and many others. International researchers have also devoted significant attention to this issue. Notable recent works include: Silvestre, B. S., Țîrcă, D. M., *Innovations for Sustainable Development: Moving Toward a Sustainable Future* [2]; T, H.-K. Yu, Huarng, K.-H., Huang, D.-H., *Causal Complexity Analysis of the Global Innovation Index* [3]; Ferreras-Garcia, R., Sales-Zaguirre, J., Serradell-Lopez, E., *Sustainable Innovation in Higher Education: the Impact of Gender on Innovation Competences* [4]; Fernández-Cruz, F. J., & Rodríguez-Legendre, F., *The Innovation Competence Profile of Teachers in Higher Education Institutions* [5]; Ojo, K. S., Volkova, N. V., *Modeling Innovation Competence Profiles: the Empowering Roles of Self-Monitoring and Resilience* [6]; Vincent-Lancrin, S. (ed.), *Measuring Innovation in Education* [7]: Chen, X-M., Chen, I-H., Jiang, X-Y., Li, X-D., Gamble, J. H., *Factors Influencing Innovation Competence among Children and Adolescents in China – A multilevel, Cross-Cohort Study* [8].

In contemporary Ukrainian research, the problem of innovation competence is reflected in various dimensions. S. V. Kyrylenko emphasizes the decisive role of IC in the professional activity of teachers, underlining its significance as an integral characteristic of pedagogical mastery [10]. Within this approach, innovativeness is considered not merely as an additional resource but as a key prerequisite for the effectiveness of the educational process in the context of constant transformations.

A more detailed examination of the content and structure of IC is offered by V. Kurok and A. Korotych, who reveal its multidimensionality in the preparation of future teachers of vocational education [11]. Their perspective highlights both cognitive and practice-oriented components, thereby enabling the design of training programs with clearly defined objectives for developing innovativeness.

The works of L. Shtefan [12] present IC through the prism of requirements for the modern educator, capable of combining traditional educational practices with new

methods and digital tools. This view reinforces the argument for the systemic integration of innovative approaches into pedagogical activity, which resonates with international trends.

Additional empirical weight is provided by the diagnostic approach of A. S. Nizhnik, who presents results of measuring the level of IC formation among secondary school teachers [13]. The data offered allow not only the identification of problem areas but also the formation of a foundation for the development of instruments for pedagogical improvement.

In the intercultural context, the study by K. S. Ojo and N. V. Volkova is particularly illustrative, modeling innovation competence profiles with special attention to the role of self-monitoring and resilience as factors that can strengthen individual trajectories of development [15]. This approach mirrors the global trend toward personalization of educational processes and enriches the Ukrainian discourse with empirically grounded models.

The analysis of recent publications shows that within the national scholarly field there is a gradual shift from the conceptual interpretation of IC to its operationalization through structures, models, and diagnostic instruments. This creates the foundation for integrating Ukrainian research into the international context, particularly in the areas of standardizing approaches to measuring and developing innovation competence.

**Unsolved Aspects of the Problem**. Thus, it can be stated that there have been significant achievements in the field of developing higher education students' innovation competence. These include addressing key issues such as: the essence, definition and components of IC; IC model; the place and role of IC in the training of professionals across various profiles; the influence of the educational environment on the formation of IC; factors affecting IC formation; methods of IC formation; creation of motivation to aquire IC; the significance of IC in the training of teachers/lecturers; the impact of educational goals on IC formation; the alignment of educational programs with IC development objectives; students' awareness of their level of IC development;

 ISSN: 2786-9458

the formation of IC in education students of different ages; the influence of gender characteristics on IC development, and several other aspects [9].

At the same time, as evidenced by the review of publications on the topic, the issues of *measuring* the level of IC formation remain insufficiently explored. Furthermore, the *self-assessment* of innovation competence among students at different levels of education has received almost no attention from researchers, despite its critical importance in the current context of educational processes in our country.

**Formulating the goals of the article (task statement).** The primary objective of this article is to explore the tool for self-assessing the level of innovation competence (IC) in education – specifically in the context of foreign language and culture teaching (FLCT) – namely, the electronic innovation portfolio (EIP), including its structure and content. The secondary objective is to clarify the theoretical foundations for compiling this educational tool.

To achieve these objectives, the following research methods were primarily employed: analysis and synthesis of current data regarding the degree of elaboration of the IC development problem both in Ukraine and internationally, with particular attention to the structure of this competence; oral surveys of higher education students aimed at studying their attitudes toward the implementation of innovations in the educational process; generalization of the viewpoints expressed by bachelor's, master's, and PhD students; scientific observation of the process of preparing qualification papers by higher education students and evaluating them in terms of their level of innovation; and a comparative analysis of types of innovations presented in students' academic publications.

**Presentation of the Primary Research Material.** Numerous definitions of innovation competence have been proposed by scholars. In this publication, following S. Kyrylenko [10], we define innovation competence of learners as "a system that includes specialized theoretical knowledge in pedagogical innovation and the theory

 ISSN: 2786-9458

of innovative pedagogical activity, the ability to effectively apply this knowledge, and practical skills that enable educators to carry out all stages of innovative activity."

The approaches to defining the *content of IC* among learners, teachers, and educators are also of considerable academic interest. Scientific literature provides a variety of perspectives on this issue. In generalized form, researchers typically include the following components in the content of innovation competence: theoretical knowledge in pedagogical innovation; subject-specific and methodological knowledge, skills, and abilities to create, evaluate, adopt, and implement pedagogical innovations in organizing the educational process; moral and ethical values; interest in and motivation for innovation; and essential personal qualities such as creativity, a focus on continuous innovation, perseverance in self-development and self-improvement, self-criticism, high creative potential, diversity of interests, tolerance, and open-mindedness [11].

Our primary focus is on the diagnostics of the level of higher education students' innovation competence development, which, in our view, remains insufficiently addressed in the scientific literature. In her article, L. Shtefan [12] analyzed the criteria-based framework for assessing the formation of professionals' innovation culture. O. Nyzhnyk [13] described approaches to diagnosing teachers' innovation competence in general secondary education institutions. Elizabeth Chell and Rosemary Athayde [14], in their work *The Identification and Measurement of Innovative Characteristics of Young People: Development of the Youth Innovation Skills Measurement Tool*, proposed instruments for measuring the level of development of IC components. Kolawole Shola Ojo and the co-author [15], in the article *Modelling Innovation Competence Profiles: The Empowering Roles of Self-Monitoring and Resilience*, emphasized the importance of self-monitoring in enhancing innovation competence.

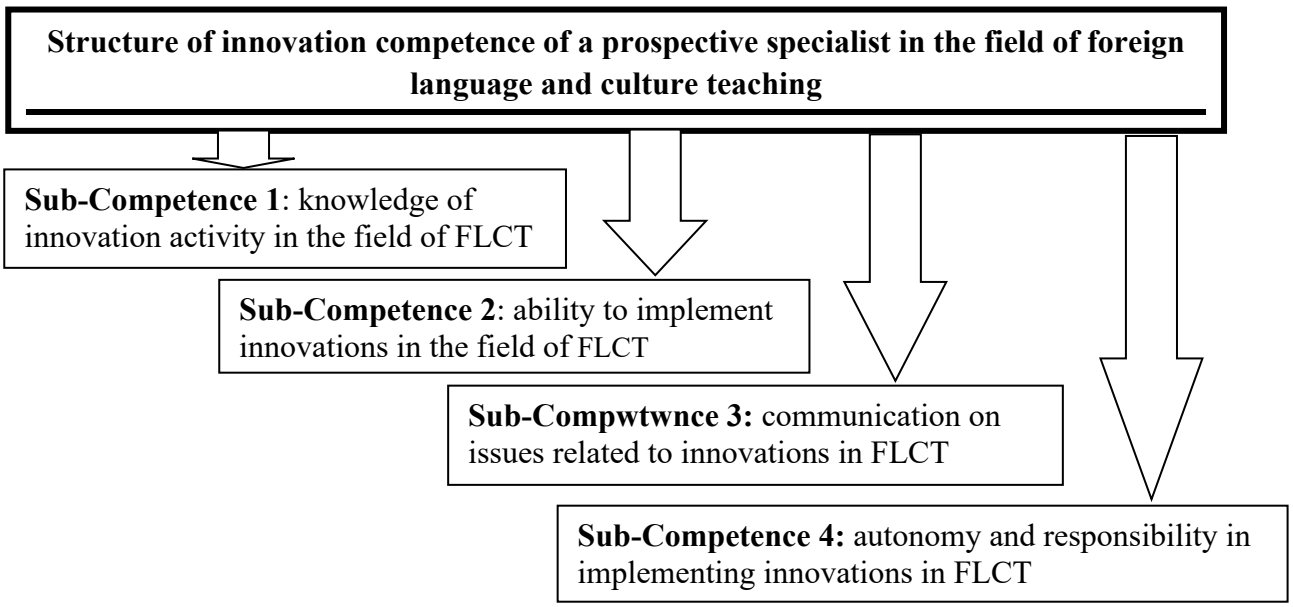
We argue that a systematic approach to defining tools for measuring IC development is largely absent from the published works. Such systematicity, in our

view, can be ensured through a reliance on the structure and content of the competence under consideration.

In our previous publications, we proposed a model for the structure of innovation competence [16] and specified the content of IC in the field of foreign language and culture education [9]. The structure of innovation competence among learners was substantiated in our article *Prospective Foreign Languages Teaching Professionals' Innovation Competence Structure*, in which we demonstrated that IC consists of four sub-competences: knowledge of innovation activity in the field of FLCT, ability to implement innovations in FLCT, communication on issues related to innovation in FLCT, and autonomy and responsibility in carrying out innovations in FLCT. In that paper, each sub-competence was further detailed as consisting of micro-competences corresponding to a specific level of education and particular stage of language learning [16] (see Fig. 1).

**Figure 1 (created by authors)**

*The structure of innovation competence of a prospective specialist in the field of foreign language and culture teaching*




Each of the above-mentioned sub-competences is further broken down into micro-competences in accordance with the levels of FLCT at the bachelor's, master's,

and PhD stages of education, and for specific years of study (from the first to the fourth one) [16].

Based on this structure of innovation competence, we have specified its content in the field of FLCT across the following blocks: a) knowledge of innovation activity in FLCT, b) the ability to implement innovations in FLCT, c) communication skills related to innovations in FLCT and d) the capacity for autonomy and responsibility in implementing innovations in FLCT. These components are described in more detail in the S. Yu. Nikolaeva publication [9].

The developed structure and content of innovation competence provide the theoretical basis for integrating diagnostic tools into the educational process to assess its formation. As for the methods of measuring the level of innovation competence development, scholars suggest empirical ones such as questionnaires, tests, diagnostic tasks, and interviews. However, as teaching practice shows, these methods are more applicable to formative and summative assessment, while our research demonstrates that the electronic innovation portfolio is more effective for self-assessment and self-monitoring of the innovation competence level formation.

By '*electronic innovation portfolio'* we mean a collection of electronic documents through which learners identify and demonstrate their achievements and experiences in developing IC. Numerous scholarly works have been devoted to this issue. Among the researchers who have contributed to the field are: S. E. Trubacheva, O. O. Prokhorenko, L. S. Panchenko, L. F. Kalysh, T. Mishenina, O. Konyk, R. C. Calfee, R. P. Perfumo, M. S. Glazer, C. S. Brown, R. Mason, D. Schön, M. Ciesielkiewicz, D. Méndez, K. Smith, H. Tillema, P. Cummins, C. Davesne, etc.

Following H. C. Barrett, we recognize the following key advantages of the electronic portfolio format: • no need to print paper versions, • ability to update and modify individual components quickly, • possibility to print either the complete portfolio or selected parts when necessary, • long-term storage on educational platforms, • open access for students to work with their portfolios and monitor or self-

 ISSN: 2786-9458

assess their progress in acquiring innovation competence, • capacity to archive multimedia learning materials in the portfolio dossier, • option to send portfolios via email instantly, if needed, and more [17].

Similar to the *European Language Portfolio* (Little D. & Perclová R.), including its electronic version (Landone E., Vrasidas Ch., Christodoulou N., & Retalis S.), we propose the following structure for a Student's Electronic Innovation Portfolio (EIP) in the field of foreign language and culture acquisition**:** Electronic Passport of Innovation Activity, Electronic Innovation Biography, Electronic Innovation Dossier. The Electronic Passport may include a photo, personal data of the learner, background information, criteria for assessing innovative achievements in language and culture acquisition, as well as the learner's self-assessment of their knowledge and ability to implement innovations in this field. The Electronic Biography is a section where the learner reflects on their experience in innovative activity within both educational and research contexts related to foreign language and culture acquisition. The Electronic Innovation Dossier is where students upload their original and innovative works related to FLCT. For effective use of such electronic portfolio, it is necessary to develop proficiency levels and self-assessment scales for the components of innovation competence in the context of FLTC. These should be based on "*I know*" and "*I can*" descriptors. The example of the EIP passport fragment is presented in Table 1.

**Table 1(created by authors)**

*Self-Assessment Scale for Measuring the Level of Innovation Competence Acquisition in the Field of Foreign Language and Culture Teaching (FLCT)*

**Instructions:** Carefully read each descriptor related to knowledge and skills. Choose Column A**,** B**,** or C depending on how you evaluate yourself, and place a ✓ in the corresponding box.

Symbols: A* – I know this confidently; I can do this well; B* – I know this poorly; I can do this with difficulty; C* – I do not know this; I cannot do this.

| **Innovation Competence** |
|---|

| **Education level……** (specify) **Year of study…….** (specify) | | | | |
|---|---|---|---|---|
| **Section 1**. | Knowledge about innovation activities in the field of FLCT in educational institutions | A* | B* | C* |
| 1.1. | I know the main goal of innovation activities in the field of FLCT in educational institutions. | | | |
| 1.2. | I know the general principles of ensuring innovation activities in the field of FLCT in educational institutions. | | | |
| 1.3. | I know the specifics of adhering to the principles of academic integrity in innovation activities in the field of FLCT in educational institutions, among other aspects, and others. | | | |
| **Section 2.** | Ability to implement innovations in the field of FLCT in educational institutions | A* | B* | C* |
| 2.1. | I can achieve the primary goal of innovative activity in the field of FLCT in educational institutions. | | | |
| 2.2. | I can adhere to the general principles of ensuring innovative activity in the field of FLCT in educational institutions. | | | |
| 2.3. | I can uphold the principles of academic integrity in innovative activities in the field of FLCT in educational institutions, and others. | | | |
| **Section 3.** | Communication on innovations in the field of FLCT in educational institutions. | A* | B* | C* |
| 3.1. | Knowledge of the requirements for spoken interaction on innovations in the field of FLCT in educational institutions. | | | |
| 3.2. | Knowledge of the basics of ethical principles in communication about innovations in the field of FLCT in educational institutions with various target audiences.. | | | |
| 3.3. | Ability to discuss the main goal of innovative activities in the field of FLCT in educational institutions, and others. | | | |
| **Section 4.** | Autonomy and responsibility in implementing innovations in FLCT in educational institutions. | A* | B* | C* |
| | *Autonomy* | | | |
| 4.1. | Autonomous acquisition of knowledge about the main goal of innovation activity in the field of FLCT in educational institutions. | | | |


ISSN: 2786-9458

| | | | | |
|---|---|---|---|---|
| 4.2. | Autonomous acquisition of knowledge about the general principles of ensuring innovation activity in the field of FLCT in educational institutions. | | | |
| 4.3. | Autonomous mastery of skills to achieve the leading goal of innovation activity in the field of FLCT in educational institutions, and others. | | | |
| | *Responsibility* | | | |
| 4.4. | Responsibility for acquiring knowledge about the subject of innovation activity in the field of FLCT in educational institutions. | A* | B* | C* |
| 4.5. | Responsibility for acquiring knowledge about the ways of implementing educational innovations in the field of FLCT in educational institutions. | | | |
| 4.6. | Responsibility for mastering the skills to adhere to the general principles of ensuring innovative activity in the field of FLCT in educational institutions, and others. | | | |

**Self-Assessment Criterion:** If you have marked more than 80% of the items in the self-assessment scale with a checkmark, you have likely achieved the indicated level. Otherwise, it is necessary to continue mastering the components of innovation competence.

The EIP can be created using various digital tools (for example, Wakelet, Padlet, Miro, Lino, Weje, Nuclino, etc.) or downloaded from the Internet (e.g., https://www.capcut.com/uk-ua/resource/best-online-portfolio-makers). For practical use, such a portfolio is hosted on any free educational platform (for example, Moodle, Microsoft Teams, Google Classroom, Edmodo, LCloud, and others) accessible to both learners and instructors.

*Future scientific explorations* should include the development of detailed proficiency scales for innovation competence in the field of FLCT and corresponding descriptors for each scale section tailored for learners at different educational levels (bachelor's, master's, PhD).

**Conclusions.** The objectives of the research have been achieved. Throughout the study, it was established that the issue of developing IC has remained a focus of scholarly interest. Its relevance is currently supported by both official state documents and by numerous publications authored by researchers and teaching practitioners. Both domestic and foreign scholars have explored and described various aspects of this competence, with particular attention given to its structure, content, and methods of formation. However, the area of measuring and self-assessment of students' IC development remains less thoroughly investigated.

The identified theoretical foundations for the development of IC made it possible to design a tool for self-assessment of the level of higher education students' innovation competence formation in the field of foreign language and culture acquisition – the Electronic Innovation Portfolio. The EIP comprises the following sections: the Electronic Passport of Innovation Activity, the Electronic Biography of Innovation Activity, and the Electronic Innovation Dossier.

The self-assessment scale for evaluating the level of learners' innovation competence in the field of FLCT consists of four components: knowledge about innovation activity in the context of FLCT in educational institutions; skills in implementing innovations in FLCT; communication about innovations in FLCT; autonomy and responsibility in carrying out innovative practices in this domain. The practical application of the EIP confirmed its effectiveness.

**Acknowledgements**. Sincere gratitude is extended to all whose scholarly ideas contributed to this research. Special thanks to the master's students who participated in the interviews and testing. During the preparation of this work, the authors used the GPT-3 Chart to optimize the translation process.

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