

Muzychenko S. V., Filon L. G. Elements of Mathematical Logic in the professional activity of a Mathematics teacher.

The article considers the role of the course "Mathematical Logic and Algorithm Theory" in the professional training of future Mathematics teachers. The relevance of the problem of developing a professionally oriented teaching methodology for this discipline has been emphasized. An analysis of scientific research devoted to the development of students' logical thinking has been carried out. Creating effective conditions for developing students' logical abilities in the process of teaching Mathematics depends on many factors, in particular, on the readiness and ability of Mathematics teachers to carry out relevant activities. The work characterizes the importance of Mathematical Logic as an educational component of the professional training program for future Mathematics teachers. Its potential impact on the formation of mathematical competence and logical literacy of higher education students has been analyzed. The places of the academic discipline in the system of fundamental mathematical training of a future specialist and its possibilities in the implementation of methodological and integration functions have been clarified. The main content units of the course have been identified, which are of primary importance for the formation of subject-specific mathematical competence of education seekers. Practice shows that the creation of an optimal methodological system for teaching the course is an extremely complex task, the main problem of which is to provide professional direction to the content of the discipline. The study presents the results of a survey of Mathematics teachers regarding the amount of residual knowledge from different sections of the course of Mathematical Logic and the Theory of Algorithms. It is assumed that there is a correlation between the amount of residual knowledge in Mathematical Logic and the teacher's competence.

Keywords: professional training of Mathematics teachers, Mathematical Logic, development of logical thinking of students, logical literacy of Mathematics teachers, subject-specific mathematical competence.

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READINESS AND RESOURCE NEEDS OF TEACHERS FOR STEM PROJECT-BASED LEARNING IN AN INCLUSIVE CLASSROOM

The purpose of the article is to investigate the level of readiness of teachers in general secondary education institutions to organise STEM project-based learning in an inclusive classroom and to identify the key resource needs that hinder the full participation of learners with special educational needs in STEM-oriented project activities. The empirical basis of the study consists of the results of a questionnaire survey conducted by academic staff and students of Sumy State Pedagogical University named after A. S. Makarenko. The survey involved 23 teachers from general secondary education institutions representing different subject specialisations and varying lengths of teaching experience, all of whom had practical experience of working in an inclusive classroom. Quantitative data analysis methods were employed in combination with a qualitative interpretation of the identified trends.

The findings revealed a pronounced asymmetry between teachers' conceptual openness to STEM project-based learning in an inclusive classroom and their operational readiness to implement it in practice. More than 86% of respondents acknowledged the potential of the STEM approach for learners with special educational needs; however, only 8.7% reported feeling fully confident in organising such learning activities. The main barriers identified were the lack of specialised equipment (65.2%), the shortage of adapted instructional materials (39.1%), and insufficient instructional time (34.8%). The study established that these barriers are systemic rather than individual in nature and cannot be reduced to a lack of teachers' personal competence.

The practical significance of the study lies in the fact that the obtained data may serve as a foundation for the development of adapted instructional materials for STEM projects in inclusive classrooms, as well as for improving pre-service and in-service teacher education programmes in the field of inclusive education. It is argued that teachers' readiness for inclusive STEM project-based learning requires systematic enhancement through targeted methodological support, the development of a team-teaching model, and the provision of appropriate instructional resources.

Promising directions for further research include the development and experimental validation of a system of adapted STEM projects for learners with different categories of special educational needs, as well as a comparative analysis of the effectiveness of various models of methodological support for teachers in inclusive education settings.

Keywords: *inclusive education, special educational needs, learners with special educational needs, STEM education, project-based learning, teacher readiness, methodological support, adaptation of the educational process, team teaching model, general secondary education institutions.*

Statement of the Problem. Contemporary Ukrainian education is undergoing a period of profound transformation driven simultaneously by several systemic factors: the reform of general secondary education in accordance with the Law of Ukraine "On Education" (2017) and the Law of Ukraine "On Complete General Secondary Education" (2020), the rapid expansion of inclusive practices as a legally established standard for organising the educational process, and the growing societal demand for STEM-oriented education as a means of developing future-oriented competencies. The intersection of these three vectors creates a qualitatively new educational reality for which many teachers remain insufficiently prepared, both methodologically and psychologically.

According to the Procedure for Organising Inclusive Education in General Secondary Education Institutions, approved by Resolution No. 957 of the Cabinet of Ministers of Ukraine (2021), educational institutions are required to ensure equal access to all forms of learning activities, including project-based activities, for learners with special educational needs (SEN). At the same time, STEM project-based learning as an educational approach has traditionally been associated with relatively homogeneous classrooms in which all participants are capable of independent inquiry, collaborative work, and abstract thinking. This implicit "norm" contrasts with the actual composition of inclusive classrooms, where learners with developmental delays, intellectual disabilities, autism spectrum disorders, sensory impairments, and emotional and behavioral difficulties may study together.

Therefore, the key scientific and practical issue is not the appropriateness of STEM project-based learning in inclusive classrooms, since its potential has been confirmed by both international and Ukrainian studies [1; 4; 5; 9], but rather teachers' actual readiness to implement it and the availability of the necessary resources. In this context, readiness is understood as an integrative characteristic encompassing methodological competence, subjective confidence in one's professional actions, and access to organisational and instructional resources. The absence of any of these components may undermine even the most carefully designed inclusive STEM lesson.

Despite the substantial body of research devoted separately to inclusive education and STEM education, the issue of their systematic integration within the context of a real Ukrainian classroom remains insufficiently explored. Particularly evident is the lack of empirical data obtained directly from practising teachers who face the daily challenges of organising joint learning for students with diverse educational needs. Consequently, investigating teachers' experiences, difficulties, and resource needs has not only theoretical significance but also considerable practical value.

Analysis of Current Research. The issue addressed in this article lies at the intersection of several scholarly discourses – inclusive pedagogy, STEM education, and teacher professional readiness – each of which has developed its own research tradition. However, their integration remains insufficiently explored in both Ukrainian and international academic literature.

The fundamental principles of inclusive pedagogy are reflected in the work of M. Ainscow, who conceptualises inclusion not as a technical mechanism for placing learners with special educational needs in mainstream educational settings, but as a systemic transformation of the educational institution itself aimed at removing barriers to participation and learning for every learner [4]. This conceptual position is of fundamental importance because it shifts responsibility from the child who “has difficulties” to the educational system that must adapt. A similar theoretical perspective is advanced by L. Florian and K. Black-Hawkins, who define inclusive pedagogy as an approach focused on expanding learning opportunities for all learners rather than merely providing additional support for specific groups [8]. Both concepts provide an important theoretical foundation for understanding why STEM project-based learning in an inclusive classroom cannot be reduced to simply “simplifying” tasks for individual learners; rather, it requires a reconsideration of the very instructional logic underpinning project work.

The issue of differentiated instruction as a practical instrument of inclusion has been examined by M. Marlina, E. Efrina, and G. Kusumastuti, who found that a differentiated approach in inclusive schools significantly enhances the academic engagement of learners with special educational needs, while simultaneously requiring substantial additional effort from teachers in terms of planning and preparing instructional materials [9]. The challenge of adapting the educational environment for learners with special educational needs in the context of STEM activities is also addressed by M. Donegan-Ritter and B. Zan, who demonstrate that inclusive STEM activities are entirely feasible when supported by purposeful educational design and appropriate teacher preparation [6]. The authors emphasise that the key factor for success is not the simplification of content but rather flexibility in forms of participation, an approach that is conceptually consistent with the principles of Universal Design for Learning.

The role of technology as a tool for promoting inclusion in contemporary education is examined in the systematic review conducted by C. R. Navas-Bonilla, J. A. Guerra-Arango, D. A. Oviedo-Guado, and D. E. Murillo-Noriega. Analysing a substantial body of research, the authors concluded that technological tools significantly expand opportunities for learners with special educational needs to participate in various forms of educational activities [10]. This finding is particularly relevant in the context of STEM project-based learning, where digital technologies constitute not merely a supplementary resource but an essential component of the educational process.

Teacher self-efficacy as a factor influencing the successful implementation of inclusive practices has been investigated by S. Woodcock, U. Sharma, P. Subban, and E. Hitches, who identified a direct relationship between teachers’ levels of self-efficacy and their actual engagement in inclusive practices [11]. Low self-efficacy, even when accompanied by formal knowledge and positive attitudes, substantially reduces the likelihood that teachers will consistently implement inclusive approaches in their professional practice. Barriers to the implementation of STEM education are discussed by J. Ejiwale, who identifies among the most significant obstacles the lack of adequate equipment, insufficient teacher preparation, and the absence of systematic administrative support [7].

Within the Ukrainian scholarly context, the issue of STEM education and pathways for its implementation in the educational process is addressed by I. Yu. Melnyk, H. D. Nefodova, and N. M. Zadyrei, who emphasise the importance of an interdisciplinary approach and appropriate methodological preparation of teachers [2]. Challenges associated with inclusive education in the Ukrainian context are analysed by Yu. Shpaliarenko, who argues that despite the formal establishment of inclusion as an educational standard, its practical implementation continues to face substantial organisational and methodological difficulties [3]. Particularly relevant to the contemporary Ukrainian context is the study conducted by N. O. Kvitka and A. V. Lapin on teachers’ readiness to work with children with special educational needs during wartime and post-war recovery. The authors emphasise the critical importance of teachers’ psychological resilience and systematic institutional support as necessary conditions for effective inclusive practice [1].

Finally, the issue of high-quality professional development as a prerequisite for the sustainable implementation of inclusive practices is explored by L. Desimone and K. Pak, who argue for the advantages of practice-based instructional coaching over traditional forms of professional development [5]. The authors demonstrate that effective teacher support must be embedded within the authentic context of professional practice rather than provided separately from it. This conclusion closely aligns with the preferences expressed by participants in our study, who identified collaborative planning with a teaching assistant as the most desirable form of support.

Thus, the analysis of the scholarly literature indicates that individual dimensions of the problem under investigation – including inclusive pedagogy, STEM education, teacher self-efficacy, and differentiated instruction – are supported by a well-developed theoretical foundation. At the same time, their systematic synthesis within the context of teachers' practical readiness for STEM project-based learning specifically in inclusive classrooms remains insufficiently explored, thereby determining both the relevance and the scientific novelty of the present study.

The **purpose** of this article is to empirically investigate the level of readiness of teachers in general secondary education institutions to organise STEM project-based learning in inclusive classrooms and to identify the key resource needs that hinder the full participation of learners with special educational needs in STEM-oriented project activities.

Presentation of the Main Material. The issue of teachers' readiness to work in inclusive classrooms is not new to Ukrainian educational research. However, its specific dimension – readiness to implement STEM project-based learning in conditions of educational diversity – remains virtually unexplored. At the same time, this particular intersection of two educational priorities is especially vulnerable in terms of methodological support and teachers' subjective confidence.

A questionnaire survey was conducted by academic staff and students of Sumy State Pedagogical University named after A. S. Makarenko and involved 23 teachers from general secondary education institutions representing different subject specialisations and levels of teaching experience. The overwhelming majority of participants were experienced educators, with more than 69% having over 11 years of professional experience, and all of them working either continuously or regularly in inclusive classrooms. Consequently, their judgments were not hypothetical but rooted in everyday educational practice.

The first and perhaps most revealing conclusion emerging from the analysis of the collected data concerns the gap between declarative and operational readiness. Most respondents demonstrated a positive attitude toward inclusive STEM project-based learning: 56.5% believed that the STEM approach is appropriate for learners with special educational needs but requires substantial adaptation, while an additional 30.4% considered it equally suitable for all learners. Thus, more than 86% of teachers recognised the potential of STEM project-based learning in inclusive educational settings, which constitutes important evidence of the teaching community's conceptual openness. However, conceptual openness and practical readiness are fundamentally different phenomena. When the same teachers were asked about their confidence in organising project work in a way that would ensure the meaningful participation of learners with special educational needs, only 8.7% reported being "completely confident," whereas 52.2% selected the response "rather confident," and 17.4% indicated that they were "rather not confident." This discrepancy between a positive attitude toward the idea and limited confidence in one's ability to implement it represents a classic indicator of a methodological deficit: teachers recognise the value of the approach but lack sufficient tools for its effective implementation.

Importantly, this deficit is not a consequence of limited experience working with learners with special educational needs. On the contrary, the sample demonstrated extensive experience with various categories of such learners: 69.6% of respondents had worked with learners with developmental delays, 65.2% with learners with intellectual disabilities, 39.1% with learners experiencing anxiety and emotional or behavioural difficulties, and 21.7% with learners with autism spectrum disorders. None of the respondents indicated a complete lack of experience working with learners with special educational needs. This suggests that the teachers who participated in the survey are not newcomers to inclusive practice. They possess established practical experience but perceive a shortage of methodological support that would enable them to integrate this experience with STEM project-based learning.

An analysis of the nature of learners' participation in project work revealed another significant contradiction. The majority of teachers (60.9%) identified individual task adaptation as their primary strategy for including learners with special educational needs in project activities. However, when this finding is compared with data concerning implementation difficulties, it becomes evident that 39.1% of respondents considered the lack of time required to prepare adapted materials a substantial barrier, while 21.7% stated that learners with special educational needs were, in practice, not involved in group work. In other words, adaptation is declared as a preferred approach but is not consistently implemented because of the absence of ready-to-use tools and adequate time resources. This is a particularly important finding: the problem lies not in the absence of pedagogical intention but in the absence of conditions necessary for its implementation.

Particular attention should be given to the issue of resource provision for STEM project-based learning in inclusive classrooms. Teachers' responses regarding the factors that most significantly hinder the implementation of STEM projects form a clear hierarchy of barriers. The most frequently identified obstacle was the lack of equipment and resources (65.2%), followed by the absence of adapted instructional materials (39.1%), insufficient instructional time, and the complexity of learning materials for learners with special educational needs (both 34.8%). This configuration of barriers indicates that the problem is systemic rather than individual in nature. It cannot be reduced to insufficient qualifications on the part of individual teachers but instead reflects structural deficiencies in the support provided by the educational system as a whole. Notably, only 13% of respondents identified insufficient teacher qualifications as a barrier, whereas 39.1% highlighted the lack of adapted instructional materials. This distinction is scientifically significant: teachers do not tend to attribute the problem to their own incompetence but instead clearly identify external systemic deficiencies.

It is therefore unsurprising that two forms of support dominated teachers' responses concerning the most useful assistance they could receive: ready-made adapted materials for each project (47.8%) and collaborative planning with a teaching assistant (34.8%). These two requests complement one another and together outline a support model that most closely corresponds to the actual needs of teachers in inclusive classrooms – not abstract training programmes or general recommendations, but concrete instructional tools combined with collaborative planning within a support team framework. This finding is consistent with contemporary understandings of the team-based approach in inclusive education, as reflected, among other documents, in the Concept for the Development of Inclusive Education in Ukraine.

Particular attention should also be paid to teachers' readiness to implement adapted STEM projects when methodological support is available. Responses to this question were highly revealing: 34.8% answered "yes, definitely," another 30.4% selected "rather yes than no," and 34.8% indicated that they would be willing to try after thorough preparation. None of the 23 respondents selected a negative response. This provides compelling evidence that the teaching community is not a passive object of educational reform but an active agent of change, willing to embrace innovation provided that genuine rather than merely declarative support is offered by the educational system.

Thus, the obtained data make it possible to outline a profile of the contemporary teacher engaged in inclusive practice. Such a teacher is an experienced professional who holds a positive attitude toward the idea of STEM project-based learning for all learners, while simultaneously experiencing an acute shortage of adapted instructional tools, time resources, and material and technical support. At the same time, this teacher's readiness remains conditional; it exists as a potential that requires systematic activation through targeted methodological support.

The conducted study makes it possible to formulate several conclusions that are of both theoretical and practical significance for the development of inclusive education in Ukraine.

- Teachers' readiness to implement STEM project-based learning in inclusive classrooms represents an internally contradictory construct: teachers' conceptual openness significantly exceeds their operational readiness. This gap between value-based commitment and methodological capacity defines the primary direction of necessary support – not persuasion regarding the value of the approach, but the provision of concrete practical tools for its implementation.

- The barriers to implementing STEM projects in inclusive classrooms are systemic rather than individual in nature. These barriers include the lack of equipment, the shortage of adapted instructional materials, and insufficient instructional time. Investments in teacher professional development without addressing these structural challenges are likely to produce only limited effects.
- Teachers' demand for collaborative planning with teaching assistants indicates an intuitive orientation of the teaching community toward team teaching as the most effective model for working in conditions of educational diversity. This finding opens prospects for the purposeful development of a culture of collaborative teaching in general secondary education institutions.
- None of the respondents rejected the possibility of implementing adapted STEM projects provided that appropriate methodological support is available. This demonstrates the existence of a genuine motivational potential within the teaching community, a potential that currently remains underutilised because of the absence of the necessary conditions for its realisation.

Conclusions and Prospects for Further Research. Summarising the findings of the present study, it can be concluded that the current state of teachers' readiness for STEM project-based learning in inclusive classrooms is characterised by a pronounced asymmetry between a positive value-based attitude towards the inclusive STEM approach and an insufficient level of methodological and resource support for its practical implementation. Overcoming this asymmetry requires coordinated efforts at several levels, including the methodological, institutional, and policy levels.

Prospects for further research in this field are multidimensional. First and foremost, there is a need to develop and experimentally validate a system of adapted STEM projects for inclusive classrooms that takes into account the specific characteristics of different categories of special educational needs. The development of such materials should be carried out through close collaboration among subject teachers, special education professionals, and educational psychologists in order to ensure both disciplinary depth and a corrective-developmental focus.

Another promising direction involves investigating the effectiveness of different models of teacher preparation for inclusive STEM education, including comparative analyses of traditional professional development programmes, practice-oriented workshops, and mentoring support provided directly within the workplace. The available data indicate that teachers place greater value on concrete practical tools than on general theoretical knowledge. However, the question of which format of support is most effective requires separate empirical investigation.

СПИСОК ВИКОРИСТАНИХ ДЖЕРЕЛ / REFERENCES

1. Квітка, Н. О., Лапін. А. В. (2025). Готовність педагогів до роботи з дітьми з ООП в умовах війни та повоєнний час. Київ. Режим доступу: <https://lib.iitta.gov.ua/id/eprint/747657/1/%D0%9F%D0%9E%D0%A1%D0%86%D0%91%D0%9D%D0%98%D0%9A%202024-25%D0%B3%D0%BE%D1%82%D0%BE%D0%B2%D0%BD%D1%96%D1%81%D1%82%D1%8C%20%D0%91%D1%96%D0%B1%D0%BB%D1%96%D0%BE%D1%82%D0%B5%D0%BA%D0%B0.pdf>. (Kvitka N. O., Lapin A. V. (2025). Teachers' Readiness to Work with Children with Special Educational Needs During Wartime and the Post-War Period. Kyiv. Retrieved from: <https://lib.iitta.gov.ua/id/eprint/747657/1/%D0%9F%D0%9E%D0%A1%D0%86%D0%91%D0%9D%D0%98%D0%9A%202024-25%D0%B3%D0%BE%D1%82%D0%BE%D0%B2%D0%BD%D1%96%D1%81%D1%82%D1%8C%20%D0%91%D1%96%D0%B1%D0%BB%D1%96%D0%BE%D1%82%D0%B5%D0%BA%D0%B0.pdf>).
2. Мельник, І. Ю., Нефьодова, Г. Д., Задирей, Н. М. (2018). STEM освіта в Україні та шляхи її впровадження в навчальний процес. *Інформаційні технології в культурі, мистецтві, освіті, науці, економіці та праві*: матеріали Міжнародної науково-практичної конференції, Київ, сс. 172–174. Режим доступу: https://elibrary.kubg.edu.ua/id/eprint/25745/1/I_Melnyk_MKonf_1904_2018_FITU.pdf. (Melnyk I. Yu., Nefodova H. D., Zadyrei N. M. (2018). STEM Education in Ukraine and Ways of Its Implementation in the Educational Process. Information Technologies in Culture, Art, Education, Science, Economics and Law: Proceedings

- of the International Scientific and Practical Conference. Kyiv. Pp. 172–174. Retrieved from: https://elibrary.kubg.edu.ua/id/eprint/25745/1/I_Melnyk_MKonf_1904_2018_FITU.pdf).
3. Шпаліаренко, Ю. (2024). Інклюзивна освіта в Україні: виклики та перспективи впровадження в закладах передвищої та вищої освіти. *Перспективи та інновації науки*, 11(45), 1049–1056. Режим доступу: [https://doi.org/10.52058/2786-4952-2024-11\(45\)-1049-1056](https://doi.org/10.52058/2786-4952-2024-11(45)-1049-1056). (Shpaliarenko Yu. (2024). Inclusive Education in Ukraine: Challenges and Prospects for Implementation in Institutions of Professional Pre-Higher and Higher Education. *Prospects and Innovations of Science*. 11(45). 1049–1056. Retrieved from: [https://doi.org/10.52058/2786-4952-2024-11\(45\)-1049-1056](https://doi.org/10.52058/2786-4952-2024-11(45)-1049-1056)).
4. Ainscow, M. (2020). Promoting inclusion and equity in education: lessons from international experiences. *Nordic Journal of Studies in Educational Policy*, 6, 1–10. Retrieved from: <https://doi.org/10.1080/20020317.2020.1729587>.
5. Desimone, L., Pak, K. (2016). Instructional Coaching as High-Quality Professional Development. *Theory Into Practice*, 56, 1–10. Retrieved from: <https://doi.org/10.1080/00405841.2016.1241947>.
6. Donegan-Ritter, M., Zan, B. (2018). Designing and Implementing Inclusive STEM Activities for Early Childhood. Retrieved from: <https://doi.org/10.4018/978-1-5225-3832-5.ch040>.
7. Ejiwale, J. (2013). Barriers To Successful Implementation of STEM Education. *Journal of Education and Learning*, 7, 63. Retrieved from: <https://doi.org/10.11591/edulearn.v7i2.220>.
8. Florian, L., Black-Hawkins, K. (2011). Exploring inclusive pedagogy. *British Educational Research Journal*, 37, 813–828. Retrieved from: <https://doi.org/10.1080/01411926.2010.501096>.
9. Marlina, M., Efrina, E., Kusumastuti, G. (2019). Differentiated Learning for Students with Special Needs in Inclusive Schools. Retrieved from: <https://doi.org/10.2991/icet-19.2019.164>.
10. Navas-Bonilla, C. R., Guerra-Arango, J. A., Oviedo-Guado, D. A., Murillo-Noriega, D. E. (2025). Inclusive education through technology: a systematic review of types, tools and characteristics. *Frontiers in Education*. 10:1527851. Retrieved from: <https://doi.org/10.3389/educ.2025.1527851>.
11. Woodcock, S., Sharma, U., Subban, P., Hitches, E. (2022). Teacher self-efficacy and inclusive education practices: Rethinking teachers' engagement with inclusive practices. *Teaching and Teacher Education*, 117, 103802. Retrieved from: <https://doi.org/10.1016/j.tate.2022.103802>.

Бабенко О. М., Глотова А. С., Матерієнко А. С. Готовність та ресурсні потреби педагогів до STEM-проектного навчання в інклюзивному класі.

Мета статті полягає у дослідженні рівня готовності педагогів закладів загальної середньої освіти до організації STEM-проектного навчання в умовах інклюзивного класу, а також у визначенні ключових ресурсних потреб, що перешкоджають повноцінному залученню здобувачів освіти з особливими освітніми потребами до проектної діяльності STEM-спрямування. Емпіричну базу статті складають результати анкетування, проведеного викладачами та здобувачами освіти Сумського державного педагогічного університету. До опитування залучено 23 педагоги закладів загальної середньої освіти з різними предметними спеціалізаціями та педагогічним стажем, які мають реальний досвід роботи в інклюзивному класі. Використано методи кількісного аналізу отриманих даних у поєднанні з якісною інтерпретацією виявлених тенденцій. Результати дослідження засвідчили виражену асиметрію між концептуальною відкритістю педагогів до STEM-проектного навчання в інклюзивному класі та їхньою операційною готовністю до його практичної реалізації. Понад 86% респондентів визнають потенціал STEM-підходу для здобувачів освіти з особливими освітніми потребами, проте лише 8,7% почуваються цілком впевненими в організації такого навчання. Основними перешкодами визначено відсутність спеціалізованого обладнання (65,2%), брак адаптованих методичних матеріалів (39,1%) та дефіцит навчального часу (34,8%). Встановлено, що зазначені перешкоди мають системний, а не індивідуальний характер і не зводяться до недостатньої особистої компетентності педагога. Практичне значення дослідження полягає у тому, що отримані дані можуть слугувати підґрунтям для розробки адаптованих дидактичних матеріалів до STEM-проектів в інклюзивному класі, а також для вдосконалення програм підготовки та підвищення кваліфікації педагогів у напрямі

інклюзивної освіти. Вважаємо, що готовність педагогів до інклюзивного STEM-проектного навчання потребує системної активації через цілеспрямовану методичну підтримку, розвиток командної моделі викладання та забезпечення відповідними дидактичними ресурсами. Перспективними напрямками подальших досліджень є розробка й експериментальна апробація системи адаптованих STEM-проектів для здобувачів освіти з різними категоріями особливих освітніх потреб, а також порівняльний аналіз ефективності різних моделей методичної підтримки педагогів в умовах інклюзивного навчання.

Ключові слова: інклюзивна освіта, особливі освітні потреби, здобувачі освіти з особливими освітніми потребами, STEM-навчання, проектна діяльність, готовність педагога, методичний супровід, адаптація освітнього процесу, командна модель викладання, заклади загальної середньої освіти.

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