

THE PROBLEM OF DEVELOPING LOGICAL THINKING IN FUTURE TEACHERS BASED ON INTERDISCIPLINARY COOPERATION AND ITS ANALYSIS

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Abstract: The article studies the theoretical and methodological foundations of developing logical thinking in future teachers, the methodology for developing logical thinking in future teachers based on interdisciplinary cooperation, the effectiveness of developing logical thinking in future teachers based on interdisciplinary cooperation. Also, The essence and theoretical foundations of the concept of logical thinking are analyzed.

Key words: pedagogue, logical thinking, theoretical and methodological basis, competence, improvement, pedagogical, technological, model, didactic, social significance, educational feature, interdisciplinary cooperation.

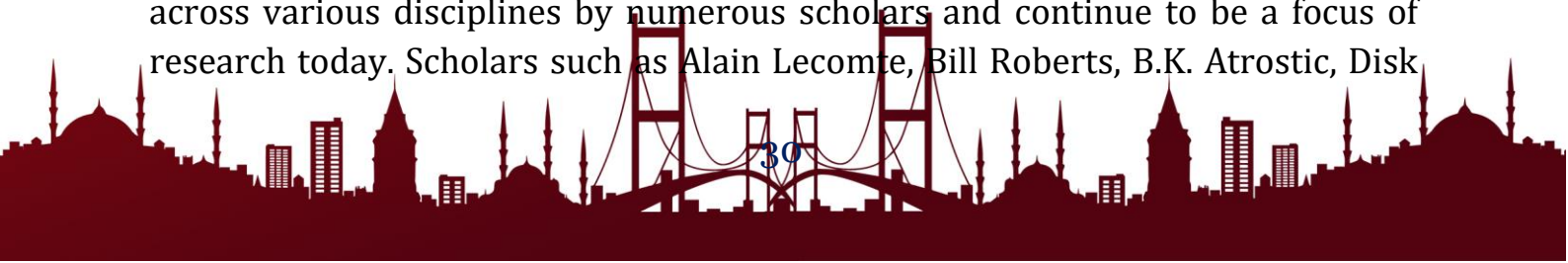
Introduction

In the context of the globalization of education, the broader application of interdisciplinary integration has become a necessity. The principle of interdisciplinary integration must be applied practically to the educational process of academic institutions. This principle ensures a comprehensive understanding of complex aspects of related academic disciplines, allowing for deeper exploration of the intrinsic essence of knowledge. As a result, internal connectivity and systemic coherence emerge within various frameworks, fostering integrative unity. Implementing interdisciplinary collaboration in the educational process significantly enhances the quality of education, supports modernization efforts, and expands opportunities for innovative teaching.

The didactic foundations of interdisciplinary collaboration are expressed in the integration of academic knowledge, encompassing various elements of the curriculum. This approach addresses contradictions in the interpretation of a single phenomenon and establishes the alignment of academic disciplines as an essential didactic condition for the successful development of each discipline's methodology.

Literature Review and Methods

The tasks of developing logical thinking have been extensively studied across various disciplines by numerous scholars and continue to be a focus of research today. Scholars such as Alain Lecomte, Bill Roberts, B.K. Atrostic, Disk



van Dalen, Dana Richards, D.H. Autor, C.B. Frey, Michał Walicki, E. Brynjolfsson, J. Monk, Y.M. Kolyagin, L.M. Fridman, L.P. Grishenko, M.Ye. Drabkina, M.V. Goryainov, M.A. Ivanova, A.G. Kurosh, O.S. Stepanova, A. Abduqodirov, R. Djurayev, U. Inoyatov, O. Musurmonova, Kh. Ibraimov, Sh. Abdullayeva, D. Ro'ziyeva, B. Abdullayeva, Z.E. Azimova, G.R. Alimatova, S. Alikhonov, S.T. Aliqulov, M. Aripov, I.V. Makukhina, Kh.B. Norbo'tayev, A.A. Salomov, A.Ch. Choriyev, and D. Sharipova have explored the philosophical, psychological, and pedagogical dimensions of developing logical thinking.

Results and Discussion

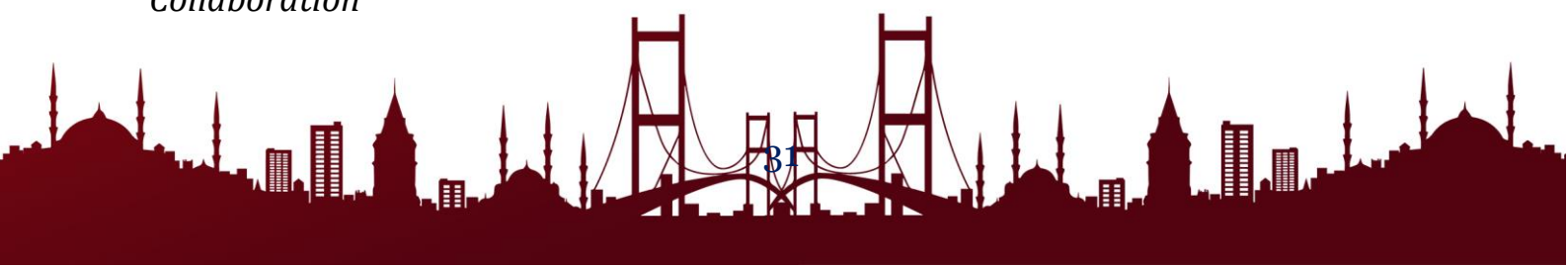
A review of the current state of the issue of developing logical thinking among future educators reveals that pedagogical efforts in this area are far from satisfactory. The following points substantiate this observation:

Exclusion of Key Disciplines: Our studies indicate that foundational subjects, such as "Logic" and "Higher Mathematics," have been removed from current curricula. The subject of Logic has been reduced to a mere 2-hour inclusion within the general Philosophy course. Delivering lectures and conducting seminars within such limited timeframes makes it extremely challenging to develop students' logical thinking. Similarly, "Higher Mathematics," which formerly played a key role in fostering logical reasoning, has been excluded from many educational programs. While previously mandatory for all specializations, it is now offered only in select disciplines, such as Psychology, Biology, Chemistry, Ecology, and Geography. This omission negatively impacts the quality and effectiveness of logical thinking development.

Lack of Targeted Pedagogical Focus: Pedagogical and professional courses, such as General Pedagogy and General Psychology, lack specific topics or approaches aimed at fostering logical reasoning or deep intellectual engagement among prospective educators. Consequently, pedagogical activities in this direction lack clear objectives.

Insufficient Emphasis on Independent and Critical Thinking: The effectiveness of developing logical thinking is closely tied to students' independent thought processes and an open academic environment. However, the current pedagogical education system provides insufficient opportunities for independent critical discourse, hindering the cultivation of a robust intellectual culture among students.

Objectives of Teaching Logical Elements through Interdisciplinary Collaboration



The main objectives of integrating logical elements into the content of pedagogical higher education institutions are as follows:

To develop and enhance a system of logical knowledge and skills that students can apply to their studies and future professional activities.

To prepare students for productive and positive engagement in a technologically advancing society by fostering precise, critical, and logical reasoning skills.

To emphasize the logical and cognitive aspects of theorem and fact validation, equipping students with the ability to provide reasoned proofs.

To instill respect for historical, spiritual, and cultural heritage, while fostering logical culture as an integral part of universal human values.

Key Tasks of Teaching Logical Elements

The main tasks associated with teaching logical elements through interdisciplinary collaboration include:

Ensuring that students acquire and master knowledge, skills, and competencies related to fundamental concepts, formulas, properties, theorems, and algorithms of logic.

Enabling students to recognize the role and importance of logic in societal development and its application in socio-economic relationships and everyday activities.

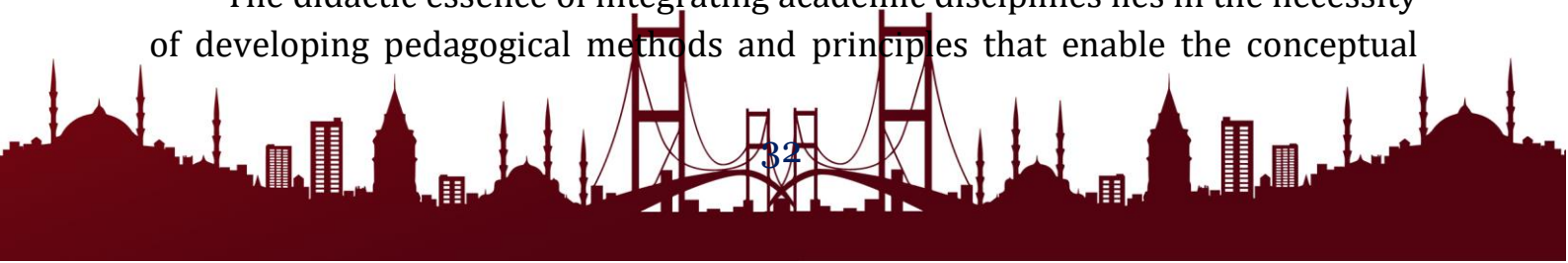
Developing independent learning skills by nurturing individual interests.

Promoting national pride, universal cultural values, and creative thinking by considering interdisciplinary connections.

Implementing systematic interdisciplinary collaboration in the development of logical thinking significantly enhances the interconnectedness of educational processes. In the current stage of modern education, the operational framework of teaching is undergoing fundamental changes, with the wide application of pedagogical technologies, integrations, and innovations in practice.

Integration serves as a means of acquiring new concepts at the boundaries of scientific knowledge. Primarily, it is necessary to fill in gaps between differentiated knowledge and establish connections between them. This process aims to enhance learners' knowledge and modernize narrow specialization in education. However, integration should not replace classical academic subjects but rather unify the knowledge acquired into a cohesive system.

The didactic essence of integrating academic disciplines lies in the necessity of developing pedagogical methods and principles that enable the conceptual



structure and methodology for forming new knowledge across various disciplines. Narrowly viewed, integration of academic disciplines is a natural continuation of the synthesis of knowledge domains and scientific insights. The primary objective of such integration is to synthesize subjective new knowledge, which is achieved through developing innovative pedagogical technologies.

The interdisciplinary collaboration approach is considered the most optimal direction for pedagogy in integrating specialized and elective subjects. The conceptual idea underpinning this approach posits that the integration of disciplines leads to the acquisition of subjective new knowledge that could not have been achieved if disciplines were taught in isolation.

DIDACTIC AND METHODOLOGICAL ASPECTS

In pedagogical research, considerable attention is given to developing methodologies, forms, and tools to overcome fragmentation in teaching academic subjects and the methodology underlying the educational and upbringing processes. Integration increases the interconnectedness and organization of system components, structuring the functioning of the system and ensuring the coherence of the studied object.

In modern didactics and methodology, it is emphasized that students' educational success and intellectual growth are closely linked to their understanding of the unity of the world. Educational integration involves viewing the content of academic disciplines through a systematic approach. In the pedagogical process, interdisciplinary collaboration fosters the development of specific skills and abilities, including:

Understanding that interdisciplinary collaboration is a complex and multifaceted didactic process.

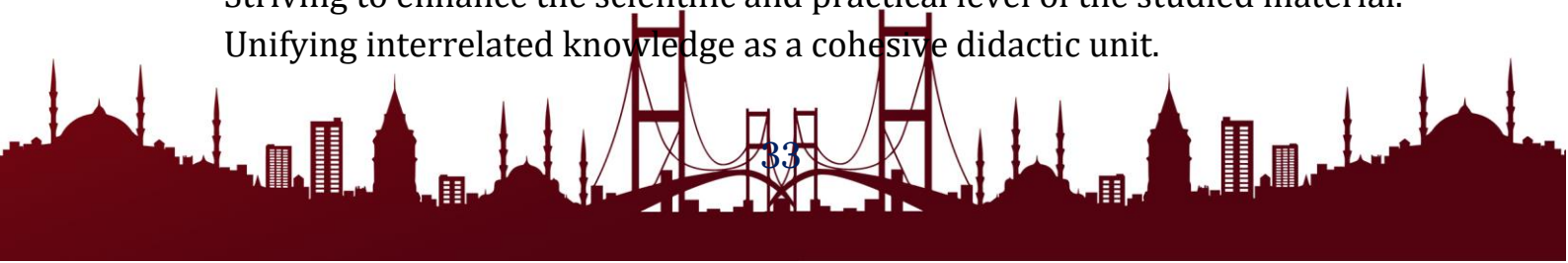
Acknowledging the philosophical basis of interdisciplinary collaboration, where the interconnected development of sciences and scientific concepts has been explored by renowned scholars. These studies emphasize that interdisciplinary collaboration is a leading didactic phenomenon within the methodological-didactic principles.

Recognizing interdisciplinary collaboration as a didactic phenomenon that improves the conditions of teaching and all forms of education.

Coordinating the content of closely related academic disciplines with great precision.

Striving to enhance the scientific and practical level of the studied material.

Unifying interrelated knowledge as a cohesive didactic unit.



Demonstrating methods for embedding systematic and stable knowledge in students' minds.

Defining tools that expand opportunities for assimilating generalized knowledge.

Interdisciplinary collaboration directly impacts the core components of the educational process, including the content of study materials, teaching methods, and technical resources, which must align with this approach.

CONCLUSION

The formulation and improvement of the content for teaching logical elements based on interdisciplinary collaboration are grounded in the following:

- Selecting, structuring, and refining educational content according to the principles, rules, and methods of didactics.
- Designing curricula for logical elements taught in pedagogical higher education institutions, guided by established requirements, construction principles, and factors for developing students' intellect and thinking.
- Considering logical elements as the foundation for understanding the world and uncovering the laws governing phenomena in the surrounding environment, production, science, technology, and technological advancement.
- Strengthening the focus on promoting and activating students' independent thinking skills.
- Developing and enhancing practical skills that enable students to effectively address issues encountered in various activities and engage in productive endeavors.

This interdisciplinary approach provides a robust framework for fostering logical thinking and preparing students to meet the challenges of a dynamic and complex educational environment.

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