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БІЛОВА Наталія Костянтинівна –

кандидат педагогічних наук, професор, професор кафедри музично-інструментальної підготовки ДЗ «Південноукраїнського національного педагогічного університету імені К. Д. Ушинського»

ORCID: <https://orcid.org/0000-0001-7147-2433>

e-mail: nkbelowo02@gmail.com

РЕАЛІЗАЦІЯ КЛАСТЕРНОГО ПІДХОДУ У МУЗИЧНО-ВИКОНАВСЬКІЙ ДІЯЛЬНОСТІ ЗДОБУВАЧІВ МИСТЕЦЬКОЇ ОСВІТИ

У статті автор розглядає кластерний підхід у музично-виконавській діяльності здобувачів мистецької освіти.

У фаховій підготовці майбутніх фахівців в галузі музичного мистецтва застосування кластерного підходу допомагає розвитку критичного та креативного художньо-образного мислення майбутніх педагогів-музикантів.

У фортепіанній підготовці здобувачів мистецької освіти кластери розуміються як пучок еталонних слухових, зорових, рухових тактильно-кінестетичних уявлень, життєвих та художніх асоціацій, множинна інтерпретація яких дозволяє музикантам-виконавцям глибинно розкривати художні образи, утворювати архітектоніку виконавських концепцій інтерпретації музичних творів.

На основі аналізу наукової літератури автор визначає індивідуальні фахово-інтерпретаційні кластери як інтегровану систему інтонаційно-слухових, рухових тактильно-кінестетичних, когнітивно-емоційних і комунікативно-емпатійних уявлень, відчуттів, переживань, емоцій, суджень, установок, які формуються у здобувачів освіти на засадах суб'єктивних узагальнень загальноприйнятих, ustalених виконавських, художньо-креативних і мистецько-педагогічних традицій як норм-еталонів.

Інтонаційно-слухові кластери є інтегрованою формою музичного мислення, музично-виконавської та музично-педагогічної діяльності, що ґрунтується на слухо-образній природі та інтонаційній сутності музичного мистецтва.

Виокремлення тактильно-кінестетичних відчуттів-еталонів ґрунтується на розумінні того, що музичні дії музиканта-виконавця у загальному сенсі є скоординованими ігровими рухами.

Когнітивно-емоційні еталони пов'язані з музикознавчою компетентністю майбутніх фахівців і трансформуються у систему розуміння, суджень, міркувань, «пропущених» майбутніми фахівцями через власні почуття й емоції.

Комунікативно-емпатійні еталонні уявлення є підґрунтям для будівництва художньо-педагогічної комунікації майбутнього фахівця в галузі музичного мистецтва у всіх можливих варіантах: між виконавцем і Автором через музичний твір (Я-Автор), аутокомунікацію через музичний твір (Я-Я), між учителем й учнем, учнями (Я-Інший) на ґрунті сприйняття й художньо-емпатійного аналізу музичного твору.

Ключові слова: кластерний підхід, фахова підготовка, музично-виконавська діяльність, кластери, уявлення-еталони, здобувачі мистецької освіти.

BILOVA Nataliia Kostyantynivna –

candidate of pedagogical sciences, professor of the department musical and instrumental training of the K. D. Ushinsky South

Ukrainian National Pedagogical University

ORCID: <https://orcid.org/0000-0001-7147-2433>

e-mail: nkbelowo02@gmail.com

IMPLEMENTATION OF THE CLUSTER APPROACH IN MUSIC EXECUTIVE ACTIVITIES OF ART EDUCATION ACQUISITIONERS

In the article, the author examines the cluster approach in the musical and performing activities of students of art education. In the professional training of future specialists in the field of musical art, the use of a cluster approach helps the development of critical and artistic thinking of future teachers-musicians.

In the piano training of students of art education, clusters are understood as a bundle of reference visual, auditory representations, life and artistic associations, on the comparison of which the performer reveals artistic images, forms the architecture of performing concepts of interpretation of musical works.

Based on the analysis of scientific literature, the author defines individual professional-interpretive clusters as an integrated system of intonation-auditory, tactile-kinesthetic, cognitive-emotional and communicative-empathic representations, feelings, experiences, emotions, judgments, attitudes that are formed in students of education on the basis of sub objective generalizations of generally accepted, established performance and art-pedagogical traditions as standard standards.

Intonational-auditory reference representations are the main form of musical thinking, musical-performance and musical-pedagogical activity, which is based on the auditory-figurative nature and intonation essence of musical art.

The isolation of tactile-kinesthetic sensations-standards is based on the understanding that the musical actions of a musician-performer in a general sense are coordinated game movements.

Cognitive-emotional benchmarks are related to the musicological competence of future specialists and are transformed into a system of understandings, judgments, reasoning, «missed» by future specialists due to their own feelings and emotions.

Communicative and empathetic reference ideas are the basis for building artistic and pedagogical communication of a future specialist in the field of musical art in all possible variants: between the performer and the Author through a musical work (I-Author), self-communication through a musical work (I-I), between a teacher and by a student, students (I-Other) on the basis of perception and artistic empathic analysis of a musical work.

Key words: cluster approach, professional training, artistic and performing interpretation, musical work, future specialist in the field of musical art.

Statement and justification of the relevance of the problem. The changes taking place in modern society naturally require corresponding transformations in the field of education, the main task of which is currently the implementation of an effective strategy for the formation of a modern personality, which in today's changing conditions must be creative, capable of critical thinking, mobile and ready for life in new reality. The modern national education system provides a person with the opportunity to develop both intellectually and spiritually at the same time and to the full extent, which is facilitated by providing each student with thorough knowledge about a person as a subject of self-development.

An individual's ability to self-development, self-analysis, self-correction, i.e. reflective self-processes aimed at personal knowledge of the inner world, control of one's own behavior, analysis and evaluation of the degree of success of one's own activities, i.e. self-reflection, which is a specific thinking mechanism, a powerful factor of self-change and self-development, acquires great importance personality A person's ability to reflect becomes especially important in the context of the professional training of students of art education, since all their professional activities are carried out in the process of artistic-pedagogical, artistic-performing, cultural-educational communicative interaction with art and through works of art with students.

So, the relevance of studying the chosen problem is determined by the fact that the individual's ability to productive professional activity is based on professional competences and is provided by the experience gained while studying at a higher education institution.

Analysis of research and publications. For future specialists in the field of musical art, a sign of quality training is their ability to artistically interpret works. This is indicated by studies of artistic and pedagogical communication skills (H. Didych, S. Grozan, Zh. Syrotkina, etc.), interpretation skills (O. Oleksyuk, D. Lisun, A. Lynenko, M. Tkach, etc.), artistic-hermeneutic competence and interpretive culture (M. Demir, Pan Na, L. Stepanova, S. Ship), processes of musical and artistic thinking in the process of piano training (Van Lu, A. Grynchenko, N. Guralnyk, N. Mozgalova, Zhou Ye, O. Shcholokova, etc.) etc.

The problem of identifying and using the artistic-creative (synergistic) potential of the cluster approach in the process of professional training of students of art education remains under-researched.

The purpose of the article is to consider the peculiarities of the implementation of the cluster approach in the musical and performing activities of students of art education.

Presenting main material. The piano training of a student of artistic education is a powerful factor in the development of self-awareness of an individual, because the future specialist must be able to convey the figurative content of a musical work to the listener, help him analyze the composer's creative intention. The piano training of a student of art education is specific and multifaceted, because it must take into account the peculiarities of all types of pedagogical activities that a

teacher-musician should carry out in the conditions of institutions of the system of art education.

Min Shaowei, relying on the statement of M. Yarova, proves that the instrumental training of a future specialist in the field of musical art has two components – performing and educational, because the purpose of professional activity is not only to reveal the figurative content of musical works in the process of instrumental performance, but also to use the educational potential of art and the comprehensive development of the personality by means of instrumental and performing activities [3].

According to V. Krytskyi, the main types of activities of a teacher-musician are the understanding of the artistic and figurative content of musical works and their sound embodiment, which goes through such stages as familiarization with a musical work, the formation of an instrumental and performing idea and the creation of an artistic and figurative interpretation of a musical work [2].

Based on the analysis of scientific studies devoted to professional, in particular instrumental training of a future specialist in the field of musical art (N. Bilova, G. Didych, I. Levytska, O. Lyashenko, V. Korzun, V. Krytskyi, E. Kuryshch, T. Pidvarko, O. Shcholokova, etc.) we can conclude that artistic interpretation involves a deep penetration into the content of a musical work, the identification of a valuable attitude to music, and the reproduction of the acquired experience in all its integrity.

Performance interpretation involves the improvement of performance skills, the selection of performance techniques that reveal the logic of the composer's artistic thinking, detailed mastery of technical and musical-aesthetic tasks, the formation of a complete musical image in the mind of the performer, and introspection of one's own performance [4].

In our opinion, it is appropriate to use a cluster approach in the musical and performing activities of students of art education. The advantage of clustering is given in economics (L. Nekrasova, S. Popenko, M. Porter, etc.), in which it is considered in the context of competitive advantage. In pedagogy, the cluster approach is used to model the structure of certain phenomena or systems, the elements of which are similar to formations in which certain properties, functions, or activities are concentrated.

According to scientists, clusters are a pedagogical technology. Pedagogical technology is a qualitative transformation-generalization of the individual mastery of the teacher in the process of collective learning and co-creation. Therefore, the most important qualities of any pedagogical technology are reproducibility, effectiveness, focus on personality development and the important possibility of diagnosing all parameters of the educational process.

Technology is manifested in a clear and correct statement of the goal of education (what we study for); in defining and specifying the content of education (what we study); in the choice of the method of organization of the educational process and means of education (how and by what means); in the professional competence of the teacher (who teaches); objective diagnosis of learning results (what has been learned).

In this, humanitarian pedagogical technologies acquire a decisive importance, the use of which determines the high intellectual and spiritual and moral potential of the personality of the teacher-musician, formed intuition, possession of a modern set of techniques and means of communication, developed empathy and reflection, etc.

Domestic and foreign scientists define pedagogical technology as «a set of psychological and pedagogical attitudes that determine a special set and composition of forms, methods, methods, teaching methods, educational tools» (S. Sysoeva); «meaningful technique of implementing the educational process» (V. Bepalko); «description of the process of achieving planned learning outcomes» (I. Volkov); «systemic, conceptual, normative, objectified, invariant description of the activity of the teacher and student, aimed at achieving the educational goal» (F. Fradkin); «the system of functioning of all components of the pedagogical process, which is built on a scientific basis, programmed in time and space and leads to planned results» (H. Selevko), etc.

All definitions of pedagogical technology reveal the procedural essence of the concept, which is considered as a method of interaction between the teacher and students, based on the optimal involvement of means and tools of educational activity.

The content of the concept of «pedagogical technology» is usually considered at four levels: 1) meta-technologies – a general pedagogical (general didactic) level that characterizes a holistic educational process; 2) macro-technologies – branch (subject) level corresponding to one branch, field of knowledge, set of methods and means for teaching and education within one subject; 3) mesotechnologies – a modular-local level that corresponds to the technology of certain types of activities (for example, vocal-performing or instrumental-performing activities); 4) microtechnologies – the operational level, aimed at solving specific tasks within one type of activity (for example, reading notes from a sheet).

Technologies have such properties as systematicity, complexity, integrity, scientificity, conceptuality, reproducibility, diagnosticity, optimality, predictability, algorithmicity, structuredness, hierarchy, logic, procedurality, variability and flexibility, manageability, efficiency, developing nature, etc. Modern educational technologies bring to the fore methods that contribute to the activation of the process of cognition during the independent and creative work of education seekers. Let's consider some of them.

Personal-oriented technology is based on personal orientation in the learning process, which involves considering education seekers as proactive, capable of independent cognitive activity, goal-setting and self-realization of objects (M. Alekseev, I. Yakymanska).

The essence of the dialogue technology is that in it the interaction is carried out for the purpose of personality development based on the maximum use of independence and initiative of the students of education. All interactive interaction technologies are built on the basis of a dialogical style of communication.

Ways of creating a dialogue situation are the diagnosis of education seekers' readiness for dialogue

communication: the presence of communicative experience, the ability and desire to express their opinion, to perceive other points of view; search for supporting motives and problems that contribute to the formation of one's own meaning of cognitive activity; design of methods of interaction of discussion participants and the conditions for their acceptance of possible roles; identifying areas of improvisation, that is, unexpected dialogue situations (immersion, game situations, discussions).

Suggestive technologies. The specificity of musical art determines the use of technologies that are united by the scientific concept of transfer and mastering of experience, i.e. these are associative-reflective, active, cognitive, psychoanalytic, gestalt technologies, etc.

The content of musical art is perceived both on a cognitive and subconscious level, and requires non-standard, special techniques and methods of mastering, creation of a special psychological atmosphere, saturated with live experiences and creative manifestations, in individual and group classes. A student of artistic education must not only be able to immerse himself in the necessary emotional state, re-creating the content of a musical image, but also influence the listeners, infecting them with his emotions filled with intellectual experience.

The suggestive concept of learning is one of the technologies of concentrated learning, which is very important for musical disciplines. «Suggestion (lat. suggestio – suggestion) is a type of purposeful communicative influence on the behavior and consciousness of a person (or a group of people)» [5, p. 256].

The concentration of means of influence on students of art education in the course of their comprehension of educational musical material, ensuring maximum immersion in the musical sound space, inclusion of all the diversity of sensory processes – all this makes it possible to achieve the effectiveness of the work of a teacher-musician.

Methods and techniques of suggestive influence on listeners are especially important in any kind of music-pedagogical activity. A suggestive effect on listeners can be provided by the «live» sound of music; emotional «infection» of listeners with the artist's artistic experience; by the flow of emotional immersion in the creation of a musical image based on empathy; intonation comprehension of the processes of development of the musical fabric; creating a polylogue situation (performer – composer – lyrical hero – performer – listener) during communication with a musical work; the organization of collective executive activity, which has a creative nature; construction of the dramaturgy of the class in accordance with the laws of formation of musical art; by creating an atmosphere of mutual understanding, trust and cooperation.

Technology of critical thinking. The creators of this technology (D. Kluster, J. A. Braus, D. Wood, I. Zagashev, S. Zair-Bek, etc.) defined critical thinking, first of all, as a reflective, evaluative understanding of one's own educational activity.

The effectiveness of technology is manifested in the development of thinking, the formation of communication skills, and the development of

independent work skills. As mentioned earlier, clusters, which are a pedagogical technology of critical thinking, are actively used in art education as well. So, for example, Wang Yajun uses a cluster approach to determine the structure of the communicative culture of future music teachers and its formation.

The researcher identified such clusters as the subject of conducting and choral training; teacher (head of the educational choir); student choirmaster and member of the choir; educational choir; educational situation; conditions of conducting and choral training, which direct the search vector for current approaches and principles, etc. [1].

According to Min Shaowei, instrumental and performing training, which is an essential component of holistic professional training, contains in its resource such functions that concentrate certain skills, knowledge, functional literacy, psychological processes and value intentions and have the form of conditional «bundles» that in science and in the social sphere is considered as a «cluster» [3].

The analysis of scientific literature made it possible to conclude that the performance-pedagogical context of piano training of students of art education determines the definition of individual professional-interpretive clusters as an integrated system of intonation-auditory, tactile-kinesthetic, cognitive-emotional and communicative-empathetic ideas, sensations, experiences, emotions, judgments, attitudes, which are formed among the students of education on the basis of subjective generalizations of generally accepted, established performing and artistic and pedagogical traditions as standard standards.

Intonational-auditory reference representations as basic standards that organize and determine the creative performing-interpretive field are the main form of musical thinking, musical-performing and musical-pedagogical activity, which is based on the auditory-figurative nature and intonation essence of musical art.

Intonational-auditory «standard clusters» reveal a semantic unit of executive formation that connects internal auditory and associative representations of the individual.

Intonational-auditory reference clusters are «experienced» by students of education, they are realized, objectified, structured and generalized into understanding, judgment through feeling, visual, plastic-motor and certain non-musical associations, which becomes the basis for searching and finding stylistically appropriate performance techniques for artistically convincing voicing – embodiment of the author's artistic idea of a musical work.

The isolation of tactile-kinesthetic clusters is based on the understanding that the musical actions of a musician-performer in the general sense are coordinated game movements. The reflection of the performer's emotions in the sound, the implementation of the constructed performance concept, all the meanings laid down by the composer are based on the skill of tactile-kinesthetic control.

Tactile-kinesthetic reference representations are designed to ensure the continuity of executive self-regulation in the process of performing a musical work based on combination and coordination with intonation-auditory clusters.

The artistic-pedagogical basis of the performing-interpretive activity of the students of education is the cognitive-emotional reference ideas, which are related to the musicological competence of the future specialists and are transformed into a system of understandings, judgments, considerations, «missed» by the future specialists due to their own feelings and emotions.

The artistic and pedagogical interpretation of musical works, the detection of their semantic content, the emotionality of the unfolding of the drama, the expression of the subject performance image (through the artistic verbalization of the decoding of the author's artistic intention and the figurative content of the works, and the sound embodiment of the created performance concept) is impossible without a formed knowledge base: musicologists, cultural, performance-methodical, musical-pedagogical.

Communicative and empathetic clusters are the basis for building artistic and pedagogical communication of the future specialist in the field of musical art in all possible variants: between the performer and the Author through a musical work (I-Author), auto-communication through a musical work (I-I), between a teacher and a student, by students (I-Other) on the basis of perception and artistic empathetic analysis of a musical work.

The defined «bundles»-images allow you to regulate your own professional activity at different levels of artistic communication: in the process of understanding a work of art through empathy, identification with a musical image, and through it – with the «image of the Other», in the process of artistic communication with students in the process of personally colored interpretation of the artistic idea, through the decoding of the artistic «message» of the author-composer in the process of educational and pedagogical activity, etc.

Conclusions and prospects of further exploration of the direction. So, in summary, we note that modern pedagogical technologies based on the cluster approach will allow to optimize the learning process, find effective forms of education and upbringing, form cognitive interests, artistic tastes and value orientations of education seekers, develop their intellectual potential.

In the professional training of students of art education, the use of a cluster approach helps the development of critical and artistic thinking of future teachers-musicians. In the musical and performing activities of students of art education, clusters are understood as a bundle of reference visual, auditory representations, life and artistic associations, on the comparison of which the performer reveals a multiplicity of artistic images, builds performing concepts of interpretation of musical works.

Clusters are formed on the basis of critical understanding and transformation of acquired knowledge, skills, experience (life, auditory, performance, etc.) in the process of comparison, comparison and critical assessment of self-evaluation of artistic and pedagogical activity.

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ВІДОМОСТІ ПРО АВТОРА

БІЛОВА Наталія Костянтинівна – кандидат педагогічних наук, професор, професор кафедри музично-інструментальної підготовки ДЗ «Південноукраїнського національного педагогічного університету імені К. Д. Ушинського».

Наукові інтереси: професійна підготовка здобувачів мистецької освіти.

INFORMATION ABOUT THE AUTHOR

BILOVA Natalia Kostyantynivna candidate of pedagogical sciences, professor, professor of the department musical and instrumental training of the K. D. Ushinsky South Ukrainian National Pedagogical University.

Scientific interests: professional training of students of art education.

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БОЛІЛИЙ Василь Олександрович –

кандидат фізико-математичних наук, доцент
ORCID: <https://orcid.org/0000-0002-1923-1058>
e-mail: vasyl.bolilyj@gmail.com

СУХОВІРСЬКА Людмила Павлівна –

кандидат педагогічних наук, доцент
ORCID: <https://orcid.org/0000-0003-0353-9354>
e-mail: suhovirskaya2011@gmail.com

АБУВАТФА Самі –

старший викладач кафедри внутрішньої медицини № 3
Донецького національного медичного університету
ORCID: <https://orcid.org/0000-0001-7245-2602>
e-mail: ab7845766@gmail.com

ВІЗУАЛІЗАЦІЯ ЗАДАЧ БІОМЕХАНІКИ ЗАСОБАМИ UNITY

В статті розглядається візуалізація задач біомеханіки засобами Unity.

Використання сучасних технологій, засобами Unity, для візуалізації біомеханічних процесів є важливим етапом у розвитку наукових методів та досліджень. Це дозволяє використовувати інтерактивні та реалістичні симуляції для аналізу та моделювання складних біомеханічних систем, що робить можливими нові підходи до дослідження та вирішення проблем. Використання інтерактивних та візуальних засобів, таких як симуляції у Unity, може покращити сприйняття матеріалу для студентів, дослідників та професіоналів у галузі біомеханіки.

В даній статті представлена розробка додатку візуальної демонстрації біомеханічної проблеми за допомогою сучасних технологій моделювання. Комп'ютерний навчальний додаток для наочної демонстрації деяких біомеханічних задач, який допомагає студентам в процесі навчання детальніше розуміти основні принципи біомеханіки на основі 3Д моделі людини з м'язовою тканиною.

Програмний додаток створено з метою наочної демонстрації біомеханічних задач, які дають можливість сформувати у студента цілісне уявлення про досліджуваній об'єкт – рухову активність людини, її частин тіла, їх зв'язки із зовнішнім – екологічним та внутрішнім середовищем. Розроблено 3Д моделі м'язів і скелета людини.