The Impact of Interdisciplinary Integrated Teaching on Innovation Ability in Undergraduate Dance Performance Education

Dan Shi*

Zhejiang Yuexiu University, Shaoxing, 31200, China
**Corresponding author:* 20062016@zyufl.edu.cn

Abstract: *The role of interdisciplinary integrated teaching in fostering innovation ability within undergraduate dance performance education remains lacking in clear theoretical explanation. From a cognitive perspective, this study defines interdisciplinary integrated teaching as a mechanism of knowledge transformation and deconstructs innovation ability into three dimensions: variation of movement morphemes, unexpected connections, and expansion of physical expression. It further demonstrates that these two constructs are linked through cognitive schema reorganization and knowledge transfer. The analysis then examines how cognitive schema reorganization transforms the representation of creative thinking problems, how knowledge transfer stimulates the capacity for movement morpheme variation, and how multimodal cognitive tools reshape divergent thinking patterns. Based on these analyses, a teaching framework for promoting innovation ability is constructed, which includes the curriculum organization logic based on the principle of interdisciplinary interaction, the design of innovation-triggering conditions in teaching interaction, and the isomorphic relationship of integrated assessment orientation. The study indicates that promoting innovation ability through interdisciplinary integration requires systematic arrangements at three levels: identification of conceptual correspondences, embedding of triggering conditions, and reconstruction of assessment dimensions.*

Keywords: *undergraduate dance performance education; interdisciplinary integrated teaching; innovation ability; cognitive schema reorganization; knowledge transfer*

Introduction

In undergraduate dance performance education, the cultivation of students' innovation ability faces a structural dilemma: professional training requires highly standardized repetition of physical techniques, whereas choreography and performance expect differentiated movement expressions. This tension makes it difficult to fully activate innovative behaviors by relying solely on internal resources of the dance discipline. Interdisciplinary integrated teaching is regarded as a potential solution, but its effectiveness depends on an answer to the mechanism of action. Current introductions of interdisciplinary content mostly remain at the level of knowledge piling up, lacking systematic designs regarding transfer conditions, cognitive perturbation methods, and assessment isomorphism, which may cause interdisciplinary teaching to become superficial or increase cognitive load. This study focuses on three core issues: the definition of interdisciplinary integrated teaching in the dance context, the observable dimensions of innovation ability in the dance field, and how the three pathways—cognitive schema reorganization, knowledge transfer, and multimodal cognitive tools—substantively influence innovation ability. On this basis, the study further explores the construction of a teaching framework for promoting innovation ability from three levels: curriculum organization, teaching interaction, and assessment orientation.

1. The Conceptual Boundary and Associative Logic of Interdisciplinary Integrated Teaching and Innovation Ability

1.1 The Definition of Interdisciplinary Integrated Teaching in Dance Performance Education

The meaning of interdisciplinary integrated teaching in undergraduate dance performance education

is often misunderstood as a simple superposition of multiple courses. In fact, it refers to a more organized approach to knowledge integration, which introduces the cognitive frameworks and operational tools of other disciplines while preserving the technical training of the dance discipline itself, thereby enabling these external forms of knowledge to genuinely enter the process of solving dance problems. For example, mechanical analysis from human movement science can help students understand the sequence of force exertion in movements, while the rhythmic structure in music can be transformed into the logic of allocating movement duration. This integration does not merely juxtapose content from different disciplines; rather, it finds commensurable conceptual interfaces within the curriculum, making interdisciplinary knowledge transfer natural and repeatable.

From an operational teaching perspective, the difficulty of interdisciplinary integrated teaching lies in balancing the relationship between the dance discipline and other disciplines. A common approach is to establish a hierarchy of a "leading discipline" and "auxiliary disciplines", with the cultivation of core competencies in dance performance as the main thread, while knowledge from other disciplines is embedded as methods or perspectives into specific teaching segments. For example, the composition principles of visual arts can be introduced into the movement choreography module, and the joint linkage principles of human anatomy can be borrowed for the body training module. The advantage of this approach is that students do not feel that disciplinary boundaries are forcibly broken; instead, they discover the usefulness of tools from other disciplines when solving specific dance problems. It can be said that the essence of interdisciplinary integrated teaching is to establish an operational knowledge transformation mechanism within the dance context.

1.2 The Basic Dimensions of Innovation Ability in the Field of Dance Performance

Innovation ability in dance performance is not a vague concept; it can be broken down into at least three observable levels. The first level is the ability to generate variations of movement morphemes, which refers to the capacity to decompose, reorganize, deform, and produce new movement units from existing movement materials. This ability is distinct from mere imitation, as it requires students to actively change the rhythm, amplitude, direction, or force exertion of movements after mastering the basic movements. The second level is the ability to make unexpected connections in choreographic structures, that is, to establish unconventional transitions between different dance segments or movement combinations, breaking the common patterns of introduction, development, climax, and conclusion, and forming structural relationships characterized by leaps or anti-logic[1].

The third level is more fundamental and is called the ability to expand the possibilities of physical expression. This ability is manifested in students' willingness and capacity to attempt ways of exerting force, spatial use, and center of gravity states that are not prescribed by traditional techniques. For example, students may break the upright posture to explore the relationship with the floor and non-horizontal planes, or they may alter the common distribution patterns of tension and relaxation to find an intermediate state between the two. These three abilities are interrelated: the variation of movement morphemes provides materials for structural connections, while the expansion of physical expression possibilities creates greater room for choice for the former two. Discussing them separately helps to more precisely observe in which link interdisciplinary integrated teaching has produced an effect.

1.3 The Theoretical Associative Pathways between Interdisciplinary Integrated Teaching and Innovation Ability

From the perspective of cognitive theory, the effect of interdisciplinary integrated teaching on innovation ability is mainly reflected in the reorganization of existing cognitive schemas. In dance performance, students who have long-term exposure to a single technical system tend to form fixed problem-solving paths; for example, when encountering unsmooth movement transitions, they only adjust the speed or amplitude. When interdisciplinary knowledge enters the classroom, such as introducing the concept of "semantic field" from linguistics, students come to view movements as interrelated "vocabulary items," thus attempting to replace, omit, or invert a particular movement. This mode of operation originally falls outside the content of dance training. In other words, interdisciplinary integrated teaching provides a cognitive perturbation that breaks the original automatic response pattern, forcing students to seek new connections between different conceptual systems, and this process is precisely the condition under which innovation occurs.

Another theoretical pathway involves the types and conditions of knowledge transfer.

Interdisciplinary integrated teaching is not a mere accumulation of knowledge from arbitrary disciplines; its effectiveness depends on the identifiability and operability of transferable elements. If students cannot transform concepts from external disciplines into parameters of dance movements, then interdisciplinary knowledge remains merely background information. Therefore, the teaching process must consciously extract those concepts with high transferability, such as transforming "syncopation" in music into uneven distribution of movement duration, or converting the "section plane" in architecture into a layer-by-layer analysis of the spatial structure of movements. The more proficient students become in this conceptual transformation, the more actively they can draw on tools from different disciplines when facing new choreographic problems, thereby demonstrating a higher level of innovation ability.

2. Mechanisms of Interdisciplinary Integrated Teaching on Innovation Ability

2.1 The Influence of Cognitive Schema Reorganization on Dance Creative Thinking

Dance creative thinking tends to form fixed cognitive schemas during long-term professional training, namely a set of automated rules for movement organization and judgment. For example, when students face a piece of music, they instinctively align the intensity of movements with the beat accents, or they restrict the use of space to the range of 180 degrees directly in front. The intervention of interdisciplinary integrated teaching is equivalent to embedding new classification dimensions into the existing schema. When the concepts of human movement biomechanics are introduced, students begin to decompose movements into joint angles, force line transmission, and torque distribution, rather than focusing only on whether the appearance of the movement is aesthetically pleasing. This schema reorganization changes the starting point of creative thinking, shifting from "does this movement look good" to "how is the force of this movement transmitted."

The deeper impact of cognitive schema reorganization lies in its reconstruction of problem representation within dance creation. For an originally poorly connected movement sequence, creative thinking might repeatedly adjust speed or amplitude; however, after schema reorganization, students can describe the problem in the language of kinematics or dynamics, such as "the rotation angle of the hip joint does not match the trunk tilt" or "the timing of the ground reaction force recovery is too early." This transformation of representation shifts creative thinking from a holistic, indivisible intuitive judgment to a parameter-level, item-by-item analytical process. Ultimately, creative thinking is no longer confined to the internal logic of dance technique but gains the ability to re-examine movement generation from the perspective of external disciplines[2].

2.2 The Stimulation of Knowledge Transfer Process on the Ability to Vary Movement Morphemes

The knowledge transfer process refers to the ability to apply concepts or operational rules learned in one disciplinary domain to another disciplinary context. In dance performance education, the ability to vary movement morphemes requires students to decompose, transform, and reorganize existing movement units. The knowledge transfer provided by interdisciplinary integrated teaching often belongs to the type of far transfer, meaning that the disciplinary fields from which knowledge is transferred are considerably different from dance. The triggering mechanism of this transfer lies in the need to abstract the transferable elements from external disciplines during the teaching process. For example, by extracting "symmetry and asymmetry" from geometry as formal rules, students can apply this rule to the variation of movement morphemes, breaking the inertia of left-right symmetry and generating asymmetric movement sequences.

The improvement of the ability to vary movement morphemes depends on the analogical mapping relationships formed during the knowledge transfer process. Students need to establish conceptual equivalence between different disciplines, such as mapping the logic of "thematic variation" in music onto the handling of movement morphemes, generating multiple variants of a core movement sequence by changing its rhythm, order, or direction. Another example is applying the concept of "inflection" from linguistics to movements, altering the meaning of an entire movement morpheme by adding, deleting, or substituting a part of the movement. Once these analogical mappings are established, students no longer rely on accidental inspiration to produce variations; instead, they can systematically and deliberately apply operational procedures from external disciplines to generate new movement materials.

2.3 The Shaping of Divergent Thinking Patterns by Multimodal Cognitive Tools

The core characteristic of divergent thinking is generating multiple ideas in different directions from the same problem. In dance performance, divergent thinking manifests as the ability to propose several distinctly different movement solutions when facing the same choreographic constraint. Multimodal cognitive tools refer to thinking frameworks or analytical methods from different disciplines, such as tree-like branching, matrix combination, and forced association. Interdisciplinary integrated teaching brings these tools into the dance classroom, which is equivalent to providing students with multiple thinking pathways. When students use only dance-specific tools, the directions of divergence tend to focus on limited dimensions such as speed, force, and spatial levels; however, once they master rhythmic displacement tools from musicology, color-emotion mapping tools from visual arts, or mass-push-pull tools from architecture, the scope of divergence is significantly expanded[3].

The shaping of divergent thinking patterns by multimodal cognitive tools is prominently reflected in how these tools change the order and density of thought generation. Without using these tools, divergent thinking often presents itself as a linear, trial-and-sequential pattern, in which students generate one solution and then produce the next solution by making fine adjustments based on the previous one. Multimodal cognitive tools, however, allow students to proceed simultaneously from multiple completely different thinking entry points. For example, students first use tools from set theory to list all possible parameter values for movements, then use tools from combinatorics to pair them randomly, and finally use generative grammar rules from linguistics to generate movement sentences. This mode of operation shifts divergent thinking from a chain-like structure to a network-like structure, where the differences between various solutions are no longer minor variations but truly heterogeneous outputs.

3. Construction of an Interdisciplinary Integrated Teaching Framework for Promoting Innovation Ability

3.1 The Logic of Curriculum Content Organization Based on the Principle of Interdisciplinary Interaction

The principle of interdisciplinary interaction points out that communicable areas exist at the conceptual level between different disciplines, and this serves as the anchoring point for curriculum integration. Common disciplinary juxtapositions, such as following a dance technique class with an anatomy lecture, fail to achieve genuine integration. The logic of organization based on this principle requires curriculum designers to identify conceptual correspondences between dance and other disciplines. For example, "center of gravity shift" and "momentum transfer" in physics refer to the same mechanical phenomenon, while "movement motive" and "thematic motive" in music share a similar logic of development. After extracting these correspondences, the curriculum is reorganized according to concept clusters rather than disciplinary boundaries, allowing students to naturally encounter corresponding external disciplinary tools while learning dance concepts.

This organizational logic can be presented in practice as a spiral sequence of concepts. For example, the first academic year centers on the interacting concepts of "force and time," simultaneously addressing the ways of exerting force in dance, the rhythmic structure in music, and the relationship between force and acceleration in physics. The second academic year moves to the theme of "space and form," connecting spatial levels in dance with dimensions in geometry and positive and negative shapes in visual arts. The third academic year deals with "structure and variation," linking the logic of segments in dance choreography with generative rules in linguistics and modular systems in architecture. Each spiral returns to the core issues of dance performance, but the difficulty of the external disciplinary tools introduced during each revisit increases progressively. The advantage of this approach is that students do not need to absorb a large amount of unfamiliar knowledge intensively in a separate interdisciplinary course; instead, they gradually establish a conceptual network across disciplines within the natural process of dance training.

3.2 Structured Design of Innovation-Triggering Conditions in Teaching Interaction

Teaching interaction involves not only question-and-answer exchanges or movement feedback between teachers and students but also a series of teaching events such as task setting, problem presentation, and constraint provision. Embedding innovation-triggering conditions in these interactive

events means altering the conventional interaction patterns so that students cannot complete the tasks solely by relying on their existing experience. One structured design approach is to set up "concept-conflict tasks," in which the same choreographic problem requires satisfying two seemingly contradictory demands from different disciplines simultaneously. For example, students are asked to express "the coexistence of gradual change and abrupt change" through dance movements, which involves both the gradual dynamics in music and the fractured composition in visual arts. Students must find a movement logic that accommodates both characteristics, and this pressure is precisely the node where innovation occurs.

Another structured design is reflected in the multi-perspective setting in the feedback stage. In conventional teaching interaction, the feedback provided by teachers is mainly based on dance technical norms and aesthetic conventions, which actually reinforces existing cognitive pathways. To trigger innovation, feedback perspectives from non-dance backgrounds can be introduced into teaching interaction, such as requiring the use of motivic development criteria from musicology to evaluate the coherence of movement sequences, or using energy consumption curves from ergonomics to evaluate the efficiency of movement combinations. These external feedback perspectives break students' single judgment of "what constitutes correct dance" and force them to re-examine their movement choices. It should be noted that such multi-perspective feedback cannot be conducted randomly; it should maintain consistency with the interdisciplinary concepts in the curriculum content; otherwise, students will feel at a loss[4].

3.3 The Isomorphic Relationship between Integrated Assessment Orientation and the Development of Innovation Ability

Assessment orientation essentially defines the types of behaviors that are recognized within a teaching system. If the assessment criteria still focus only on the normative execution of dance techniques and the aesthetic integrity of choreographic works, then the innovation ability that interdisciplinary integrated teaching seeks to cultivate will hardly gain a legitimate position in students' learning motivation. An integrated assessment orientation means that the evaluation dimensions themselves should be interdisciplinary, which entails assessing not only the final movement output but also the density of knowledge transfer and the accuracy of conceptual transformation. Specifically, two assessment dimensions with similar weights can be established: the first dimension is the degree of completion within the dance discipline itself, including the force of movements, spatial use, rhythmic accuracy, and so on; the second dimension is the performance of interdisciplinary integration, such as the types of external disciplinary tools used in the process of movement generation, the clarity of conceptual correspondences, and the frequency of unconventional solutions[5].

The establishment of this isomorphic relationship also needs to be reflected in the scoring criteria and descriptor language. In conventional evaluation systems, "innovation" often exists as a vague bonus item without clear judgment criteria. An integrated assessment orientation requires the decomposition of behavioral indicators of innovation ability into scoring rubrics. For example, an indicator such as "diversity of sources of movement morpheme variation" can be established, with the scoring basis being how many different types of variation operations (such as inversion, reduction, expansion, substitution, etc.) the student has used in choreography, and these operations precisely originate from conceptual tools in linguistics or musicology. The isomorphism between assessment tools and teaching objectives enables students to clearly see that innovation ability is not a mysterious personal talent but a set of trainable, observable, and evaluable behavioral performances. In turn, teachers can also use assessment data to determine which interdisciplinary teaching strategies have had an actual effect on innovation ability.

Conclusion

This study systematically clarifies the logical influence of interdisciplinary integrated teaching on innovation ability in undergraduate dance performance education, ranging from conceptual definition and mechanisms of action to the construction of a teaching framework. The research shows that the promotion of innovation ability through interdisciplinary integration depends on three progressive conditions: at the conceptual level, interdisciplinary integration should be defined as a knowledge transformation mechanism rather than disciplinary juxtaposition, and innovation ability needs to be decomposed into observable dimensions such as variation of movement morphemes, unexpected connections, and expansion of physical expression; at the mechanism level, interdisciplinary

integration transforms the problem representation of creative thinking through cognitive schema reorganization, stimulates the ability to vary movement morphemes by means of analogical mapping in far transfer, and reshapes divergent thinking from a chain-like pattern into a network-like pattern through multimodal cognitive tools; at the framework level, it is necessary to identify conceptual correspondences based on the principle of interdisciplinary interaction and adopt a spiral curriculum organization, embed concept-conflict tasks and multi-perspective feedback to trigger innovation, and establish an isomorphic relationship between innovation ability and the evaluation system through an integrated assessment orientation. This theoretical model provides an analytical framework for the design and implementation of interdisciplinary integrated teaching. Future research may further track the changes in brain functional connectivity of the three mechanisms at the cognitive neuroscience level, and develop modular teaching tools for different interdisciplinary combinations to examine the differentiated effects of discipline types on various dimensions of innovation ability.

References

[1] Dong Wangfeifei. "A Study on the Construction of a Practical Teaching System for Dance Performance Majors from the Perspective of Applied Talent Cultivation." Jiangxin, 01(2026):59-61.
[2] Yang Lei. "Reform and Innovation of Dance Professional Education and Teaching in Colleges and Universities under the Guidance of Aesthetic Psychology: A Review of 'Research on Dance Performance Theory and Dance Teaching in Colleges and Universities'." Higher Education Management, 19.03(2025):125.
[3] Yang Jianyan, et al. "An Exploration of the Construction of a Teaching Innovation Team for Dance Performance Professional Teachers under the Background of 'Double High'." Journal of Kunming Metallurgy College, 40.05(2024):61-65.
[4] Zhang Qiong. "Reform and Innovation of Dance Education in Colleges and Universities in the New Era: A Review of 'Research on Dance Education and Dance Performance Art in Colleges and Universities'." Educational Development Research, 42.17(2022):86.
[5] Zhang Nanjie, Yu Meng, and Yao Yu. "Practice and Reflection on Interdisciplinary Integrated Teaching of Dance." Journal of the Chinese Society of Education, S2(2023):176-177+190.