

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

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Abstract: *The effect of cross-disciplinary integrated teaching on fostering the innovative ability of undergraduate dance performance education has not been studied in theory. Cognitively, cross-disciplinary integrated teaching is a kind of knowledge transformation mentioned in this paper, and the three dimensions of innovation ability are divided into variations in movement morphemes, unexpected connections, and expansion of physical expression. Therefore, it can be concluded that the two are linked by the organisation of cognitive schemas and knowledge transfer. Next, we will investigate how the organisation of cognitive schemas affects the representation of problems in creative thinking; how does knowledge transfer promote the ability for variation in movement morphemes; and what is the effect of multimodal cognitive tools on divergent thinking? Based on the above analysis, a teaching framework for cultivating students' innovative ability has been proposed; it will organise the curriculum according to the principle of interdisciplinarity, create an inspiring environment for students to be innovative in teaching and learning, and build an isomorphic system of integrated assessment. Based on the above research, in order to promote students' ability for innovation through interdisciplinary integration, the following three systematic measures should be taken: identify conceptual correspondences, create triggering conditions and reconstruct assessment dimensions.*

Keywords: *Undergraduate Dance Performance Education, Interdisciplinary integrated teaching, Innovation ability, Cognitive schema reorganization, Knowledge transfer*

Introduction

There is a structural problem in the development of students' innovative ability in undergraduate dance performance education: professional training requires standardised repetition of physical skills, but choreography and performance demand various expressions of movement. Due to this conflict, the new behaviour will not be fully realised if only the internal resources of the dance subject are employed. The general direction will be to carry out interdisciplinary integrated teaching, and now we need to clarify how this will be done in practice. At present, the introduction of interdisciplinary content is mainly at the level of knowledge accumulation; there is no systematic design of transfer conditions, cognitive perturbation methods and assessment isomorphism, and thus interdisciplinary teaching may be superficial or increase cognitive load. The three contents of this paper are: the definition of interdisciplinary integrated teaching in the context of dance, the observable dimensions of innovation ability in the field of dance, and how the three pathways—cognitive schema reorganization, knowledge transfer and multimodal cognitive tools—substantively affect innovation ability. Therefore, the following paper will construct a teaching framework to promote the ability of innovation at the three levels of curriculum organisation, teaching interaction and assessment orientation.

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

1.1 The Concept of Interdisciplinary Integrated Teaching in Dance Performance Education

The purpose of interdisciplinary integrated teaching in undergraduate dance performance education is not to add a few extra courses. In fact, it is an organised way of integrating knowledge that introduces the cognitive frameworks and operational tools of other subjects while keeping the technical

training of the dance discipline itself, so that these external forms of knowledge can be used to solve problems in dance in an authentic way. Mechanical analysis based on the science of human movement can help students learn the order of force application in motion, and the rhythmic structure of music can be taken as the logic for distributing the length of movement. Integration is not only the arrangement of content from all parts; it also refers to the common ideas in the curriculum that enable easy and continuous transfer of knowledge among different subjects.

One of the problems in the operation teaching of all subjects is how to integrate them with the subject of dance. A typical way is to set up a hierarchy of "leading disciplines" and "auxiliary disciplines", make the cultivation of core competencies in dance performance the main focus, and incorporate knowledge from other disciplines as means or angles for teaching in specific parts. For example, the composition rules of visual arts can be applied to the design of movement choreography in this class, and the connection principles of human anatomy can be used in body training. The first is that the students will not feel that the disciplinary boundary has been crossed; instead, they will learn to use tools from other subjects to solve some problems in dance. It can be said that the purpose of cross-curricular integration in teaching is to build a system of knowledge construction for the subject of dance.

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

The idea of "innovation ability in dance performance" is not vague; it can be divided into the following three types. The first level is the ability to create variations of movement morphemes; that is, the capacity to decompose, organise, deform and generate new movement units from existing materials of movement. Do not imitate it; instead, based on what has been learned in the basic exercises, one should be able to change the speed, volume, direction and strength of movement. The second level is the ability to make unexpected connections in choreographic structures; that is, to create irregular transitions among the different parts of a dance or combinations of movements and break the usual pattern of introduction, development, climax and conclusion to form structural relationships with leaps or anti-logic^[1].

The third level is more fundamental, and it is called the capacity to extend the range of physical expression. Given that the students are eager to try all kinds of ways to apply force, use space and move the centre of gravity in an unconventional manner, we have observed the above. Students can lower their upper body to feel the support of the floor and other horizontal surfaces, or they can change the usual distribution of tension and relaxation to find a middle ground between the two. The three abilities are related; new motion morphemes can provide material for structural linkage, and by expanding the scope of physical expression, we can increase the options for the first two. We can consider them one by one to find out which link in the interdisciplinary integrated teaching has been effective.

1.3 Theoretical Associative Pathways of Interdisciplinary Integrated Teaching and Innovation Ability

According to the theory of cognition, changes in students' original cognitive systems will be caused by the application of interdisciplinary integrated teaching, and their innovation ability will be affected. Students who have been using the same technical system for a long time tend to develop a fixed way of solving problems; for instance, when they meet a change in the direction of motion, they can only modify the speed or amplitude. When introducing cross-disciplinary knowledge in class, such as the concept of a "semantic field" in linguistics, students can begin to see movements as related "vocabulary items" and thus substitute, omit or invert a particular movement. The first aim of this kind of operation was not to teach dance. That is to say, the result of cross-disciplinary integrated teaching is a cognitive disturbance that breaks the original pattern of automatic response; it needs to be built upon new links among all systems of knowledge, and this process is precisely what constitutes innovation.

The other is the kind and circumstances of knowledge dissemination. Interdisciplinary integrated teaching is not just the accumulation of knowledge from all subjects; rather, it is effective when transferable elements can be identified and used. If the students are unable to turn the concepts of other areas into parameters for dance movement, then the interdisciplinary knowledge will be of no use. Therefore, during the course of teaching, we need to extract concepts with good transferability; for example, we can present "syncopation" in music as an uneven distribution of movement duration, or we can change the "section plane" of architecture into a layered analysis of the spatial structure of

movement. The more proficient students are in this conceptual change, the more actively they can use tools from all kinds of areas to solve new choreographic problems and show a higher degree of innovation.

2. Mechanisms of Interdisciplinary Integrated Teaching on Innovation Ability

2.1 The Effect of Cognitive Schema Reorganisation on Dance Creative Thinking

Generally speaking, changes in people's attitudes towards dance are the formation of stable cognitive schemas after a long period of professional training; these schemas are sets of automatic rules for organising and evaluating movement. For instance, when students hear a piece of music, they will naturally match the intensity of their movement with the beat accent, or they will limit the use of space to about 180 degrees directly in front of them. The addition of a new branch in the current system is the addition of interdisciplinary integrated teaching. With the addition of the concept of biomechanics for human movement, students begin to divide movement into joint angles, force-line transmission and torque distribution, and are no longer only concerned with whether the appearance of the movement is aesthetically pleasing. The first step in the new plan for organisation is to consider how a force is transmitted by motion, and not begin with the problem of aesthetics.

Another kind of effect of the rearrangement of cognitive schemas is the reconstruction of problems in dance creation. If the original movement sequence is not well connected, one can repeatedly adjust the speed or amplitude in a creative way; however, after reorganising the schema, students can express the problem in the language of kinematics or dynamics, such as "the rotation angle of the hip joint does not match the tilt of the trunk" or "the timing of the recovery of ground reaction force is too early". Therefore, the form of representation is no longer a whole-intuitive idea but rather a list of attributes. Finally, creative thinking is no longer confined to the internal logic of dance technique; it has also begun to be applied in other areas to create movement ideas^[2].

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

The process of knowledge transfer is the application of ideas and operating rules from one field of study to another. The ability of a student in dance performance education to vary movement morphemes is to deconstruct, modify and rearrange the basic units of movement. The knowledge transfer that results from interdisciplinary integrated teaching often falls under the category of far transfer; that is to say, the disciplinary areas of the knowledge are quite different from those of dance. The reason for this transfer is that we need to extract the transferable parts of knowledge from other subjects in the teaching process. For instance, "symmetry and asymmetry" can be obtained from geometry as a formal rule, and then this rule can be applied to the variation of movement morphemes to break the inertia of left-right symmetry and create asymmetric movement sequences.

The increase in the capacity for variation of movement morphemes is based on analogical mapping relationships that have been established in the process of knowledge transfer. Students should be able to build a concept of equivalence among all the subjects; for example, they can map the logic of "thematic variation" in music to how movement morphemes are used and create many variations of a basic movement sequence by changing rhythm, order or direction. Another is to apply the linguistic concept of "inflection" to movement; that is, by adding, omitting or substituting a component of a movement, one can change the general meaning of a movement morpheme. Based on the above analogies, students will be able to intentionally create all kinds of organised variations by employing the operating methods of other subjects, rather than being inspired by chance.

2.3 Formation of Divergent Thinking Patterns by Means of Multiple Modes

The first characteristic of divergent thinking is that many different ideas can be derived from a single problem. Divergent thinking in dance performance is the ability to show many different ways of moving in response to the same choreographic requirement. Many kinds of cognitive tools are thinking systems and analysis methods that have come from all over, such as tree-like branching, matrix combination and forced association. Integrated teaching based on all kinds of materials can introduce many types of thinking tools for students in the dance class. With only the tools of dance, there are few ways to create divergence; generally, this is limited to changes in speed, strength and position, but after learning to use tools for rhythmic displacement from musicology, tools for colour-emotion mapping

from visual arts, or mass-push-pull tools from architecture, the scope of divergence can be greatly expanded^[3].

A pattern of divergent thinking can be formed by using all kinds of cognitive tools, and these tools will change the order and focus of thought generation. Without the help of these tools, divergent thinking is usually in the form of linearity and trial-and-error; students will come up with one solution and then make minor adjustments to it to get the next one. Many kinds of thinking can start from the same place, and multimodal cognitive tools are one such type. For example, students can list all possible values of the parameters for movement using the tools of set theory, randomly pair them with the tools of combinatorics, and then apply generative grammar rules from linguistics to generate movement sentences. The first is that it is no longer a single-file line; rather, it has been organised in a network form, and the differences among the various solutions are quite significant, not minor.

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

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

According to the principle of cross-curricular collaboration, there are common concepts in all subjects at a certain level, and thus curriculum integration can be achieved. Most disciplinary juxtapositions, such as taking a dance technique class and then an anatomy class, are not truly integrated. Based on the above analysis, curriculum designers need to find conceptual correspondences between dance and other subjects in the organisation logic. For example, the "centre of gravity shift" and "momentum transfer" in physics are the same type of mechanical phenomenon, and "movement motive" and "thematic motive" in music are also related by the same logic of development. Based on the above correlations, the curriculum will be organised in clusters of concepts rather than by subjects, and students can learn related tools from other areas during their study of dance concepts spontaneously.

Organisational Logic can be presented in the form of a spiral sequence of ideas. For example, in the first academic year, the intersection of the ideas of "force and time" will be explored; we will learn how to use force in dance, what rhythm exists in music, and how force relates to acceleration in physics. The theme of the second academic year is "space and form", so the spatial levels in dance will be connected with dimensions in geometry and positive and negative shapes in visual arts. The third academic year is "Structure and Variation", and it will connect the logic of segments in dance choreography with generative rules in linguistics and modular systems in architecture. Although each spiral is still the same problem of dance performance, the difficulty of the external disciplinary tools added in the revisions gradually increases. First of all, students do not need to learn many new points of knowledge in a separate interdisciplinary course; rather, they gradually form a concept network among all the subjects during the process of dance training.

3.2 Structured Design of Innovation-Triggering Conditions in Teaching Interaction

Teaching interaction refers to all kinds of communication among teachers and students, both verbal and non-verbal, as well as other teaching activities such as giving tasks, presenting problems, providing constraints, etc. Create a good atmosphere for innovation in interactive activities, move away from the old way of interaction, and prevent students from solving problems based on their previous knowledge. Organised Design is a type of "concept-conflict task" that needs to meet the same choreographic problem but also satisfy two different requirements from different areas. For example, students may be asked to present the "coexistence of gradual change and abrupt change" in dance, and this includes both the slow development of music and the broken composition of visual arts. The two attributes need to be combined to get the movement logic, and then innovation can be achieved.

Another kind of organisation is shown by the many views in the feedback stage. In the past, teachers' feedback to guide and instruct students has mainly focused on correcting errors in skills and aesthetics and has not promoted all-round development of students. To inspire new teaching ideas, feedback from people outside the field of dance can also be obtained; for example, musicological criteria for the development of motives can be applied to judge the unity of movement sequences, and energy-consumption curves from ergonomics can be used to determine the efficiency of movement combinations. The above external feedback will make the students think differently about what is considered "good" in dance and change their way of moving. It should be pointed out that such

multi-perspective feedback should not be random; rather, it needs to be in line with the interdisciplinary concepts in the curriculum content, otherwise, students will be left without direction^[4].

3.3 The Isomorphism of Integrated Assessment Orientation and the Development of Innovation Ability

Assessment orientation refers to the kinds of behaviour that are considered by a teaching system. If the assessment standards continue to be based only on whether students can correctly apply dance techniques and how beautiful the choreography is, then the ability for integration across different subjects that interdisciplinary teaching hopes to foster will be overlooked in the students' learning motivation. All parts of a complete assessment attitude should be taken into account in the evaluation, so it should not only be judged by the final movement output but also by the spread of knowledge and changes in concepts. Specifically, the two assessment dimensions with similar weights can be set up: the first is the level of achievement in the dance discipline itself, such as the power of movement, use of space, rhythmic accuracy, etc.; the second is the execution of interdisciplinary integration, such as the kinds of external disciplinary tools employed in the process of movement generation, the clarity of conceptual correspondence, and the frequency of unconventional solutions^[5].

The construction of this isomorphic relationship should also be reflected in the scoring standards and descriptor language. The old assessment system did not define "innovation" properly and thus did not cover it. Breakdown of behavioural indicators in the innovation ability assessment should be turned into scoring rubrics. For example, one can build an index called "diversity of sources for variation in movement morphemes", and its score reflects how many different types of variation operations (such as inversion, reduction, expansion, substitution, etc.) a student has employed in choreography, which in turn stem from conceptual tools in linguistics or musicology. As the assessment tool is isomorphic with the teaching objectives, the quality of innovation is not an innate or mysterious trait but rather a set of teachable, observable, and measurable behaviours. According to the results of the assessment, teachers will be aware of which interdisciplinary teaching methods have been more effective in cultivating students' innovative abilities.

Conclusion

Systematically present the logical path of how interdisciplinary integrated teaching affects the innovation ability of undergraduates in dance performance education, start with the definition of concepts and operational mechanisms, and end with the construction of a teaching framework in this paper. Based on the above research, in order to promote the innovative ability of young children through interdisciplinary integration, the following three progressive conditions need to be met. First, in terms of concepts, all the above subjects should be considered as a type of knowledge transformation and not merely as the combination of several courses; therefore, the innovative ability needs to be shown in observable ways, such as modifications to movement morphemes, unexpected correlations, and enlargements in physical expressions. Second, in terms of mechanisms, the problems of cross-disciplinary integration can be organised into cognitive schemas to foster creative thinking; they can inspire the ability to vary movement morphemes through analogical mapping in far transfer, and, by using all kinds of cognitive tools, the chain-like structure of divergent thinking can be changed into a network structure. Finally, in accordance with the principle of interdisciplinary interaction at the framework level, conceptual correspondences need to be unraveled, a spiral curriculum should be introduced, concept-conflict tasks and multi-perspective feedback should be added to promote innovation, and an isomorphic relationship between innovative ability and the evaluation system should be established through all-encompassing assessment. The theoretical model above will be used as the basis for the development and implementation of cross-curricular teaching. Future research will continue to monitor the changes in brain functional connectivity of the three mechanisms at the level of cognitive neuroscience, and modular teaching tools for different interdisciplinary combinations will be developed to study the differentiated effects of various types of disciplines on various aspects of innovation ability.

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