The Application
of Piaget and
Bruner's
Cognitive-
Developmental
Theory in
Children's Dance
Teaching

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Abstract

The research is investigating the theory of Cognitive Development for children, and its application onto the importance of children dance. As a dancing teacher myself, the researcher understood that it's necessary to give different teaching style and lecture contents for children of different ages. If cooperate with Theory of Cognitive Development, it's foreseen to have the children growing healthily and learning happily. The research is mainly using Jean Paul Piaget and Jerome Seymour Bruner's cognitive development as the tools. Through documental analysis, the goal is to identify the connection between these two theories and children dancing, as well as the appliance on dancing education. If the teachers have good understanding on the behaviors for different children cognitive developments and the corresponding behavior characteristics, then they will have enough knowledge background to choose the suitable dancing technique for different ages. The teacher will be able to put the children's instinct and requirements into consideration and design a sequential lesson that coordinates children cognitive developments and theory, thus accomplished "Adaptive Instruction". Not only the teacher can monitor children's cognitive development and learning outcome, but also can provide the children a chance to explore, and satisfy the curiosity. The ultimate goal is to stimulate the body function and improve the motive to learn for the children.

Key words: J.P. Piaget, J.S. Bruner, Cognitive-developmental theory, Children's dance

Introduction

Research background and motivation

The development of physiological growth lies in continuous activities and explorations for children in the process of growing up. To achieve the balance of physiological development, children are born with thirst for physical activities and such thirst must be met. The living environment in terms of physiological and psychological developments for children is a multi-changeable and unstable situation, all sorts of learning help establish order in children's lives and among which only dancing requires physical postures to express directly, and it brings great benefits to the establishment and promotion of self-worth and self-confidence (Chingchuan Huang, 2009). Dancing helps children promote the growth of physical, emotional, social, and cognitive developments (Cluphf & O'Connor, 2001), and yet it is an innate ability of expressing emotions and thoughts before the formation of complete language ability among children (Meichu Liu, 2005).

The researcher of this study is engaged in teaching dance to children ranging from 3 to 15 years old, and in the face of students of different ages, courses are bound to differ accordingly. As for the curriculum design, there is actually no such thing called dancing textbook for curriculum is mostly based on teachers' own experiences in learning and teaching accumulated through years; however, it is not necessarily applicable for everyone; one's growth and development varies by age resulting in different physiological phenomena and psychological performances, thus the so-called "Adaptive Instruction" must focus on the learner's development stage and the design must meet the needs of teaching contents in order to facilitate an environment of healthy growing and happy learning for children. For preschoolers, the cognitive development of children is the most influential phase in the process of growing, the concept in terms of psychology and preschool education is identified as an important theory in children's potential development. However, in the field of dance teaching, the literature relevant to the link between children's cognitive development and dance teaching is scarce. In view of this, the researcher hopes to include children's cognitive development into the dance teaching and put forward suggestions

The Application
of Piaget and
Bruner's
Cognitive-
Developmental
Theory in
Children's Dance
Teaching

related to dance teaching as well as to provide useful tips and suggestions for others engaged in this field of profession, and establish a link between children's cognitive development and dance teaching.

The research believes that the teacher must have a certain degree of understanding of children's cognitive development to design suitable dancing curriculum and teaching methods applicable to students' ages and physical and psychological status using the language they can comprehend in accordance with each stage of development and the relation between developmental characteristics and dance postures coupling with theories proposed by scholars in order to stir them to cognition and learning, and hence the effort can lead to more appropriate teaching, more effective teaching, and happier learning. During childhood, if the teacher could provide step-by-step dancing curriculum based on children's cognitive development, not only the physical development and body awareness could be benefitted and progressed, but as well as an interpersonal relationship fulfilled with self-confidence and self-worth. In terms of dance learning, not only a good foundation could be established during childhood, future development could be as benefitted as well. Therefore, it is necessary to explore how children's cognitive development could be applied to dance teaching.

In the theories concerning children's cognitive development, theories proposed by Piaget and Bruner have received considerable attention and are the most widely discussed. In this study, theories conducted by them will be centrally focused that their main aspects and teaching principles will be covered and described firstly, and then move on to the analysis of the association between these two theories of cognitive development and dance classes for children; and secondly, provide suggestions regarding children's dance teaching in accordance with theoretical aspects, and hopefully dance teachers will be inspired through the combination of theory and application so the effect can go on and on. Besides understanding the cognitive development of children, this study also wishes to apply various arguments and theories to dance teaching and construct a suitable teaching curriculum in order to increase the teaching effectiveness and accomplish the standard of adaptive learning with students' talents.

Research purposes

Based on the above-mentioned motivation, purposes of this study are as follows:

(1) To explore the association between theories of cognitive development proposed by Piaget and Bruner and children's dancing.

(2) To apply the theories of cognitive development to children's dance teaching and provide suggestions based on the study findings.

Research method and steps

This study was conducted by the "document analysis methodology". Document analysis is a technique used to gather documents and then extract and compile data that is useful from the gathered documents. In this study, documents concerning topics related to Piaget and Bruner's theories will be mainly focused on and further be reviewed and collected. Through theories and principles of cognitive development and along with information related to children's body movements, to analyze the association between the two and use it as the theoretical basis for children's dancing curriculum design. In accordance with the above-mentioned purposes, steps this study is comprised of: First, carefully examine theories of cognitive development proposed by Piaget and Bruner carefully and summarize important concepts; second, analyze the idea and principles the two theories stand for in terms of teaching and curriculum; after analyzing, propose the association between the cognitive theory and children's dancing curriculum and apply it to children's dance teaching as the curriculum design reference, and at last, provide conclusions and suggestions.

The scope of research and limitations

The age range is based on the stages defined by Piaget and Bruner. Four cognitive development stages are described in Piaget's theory, from age 0 to prior 15; although age range is not clearly defined in Bruner's cognitive development theory, but we can still determine it ranges from ages 1 to roughly 6 according to development characteristics. Theories of cognitive development proposed by Piaget and Bruner will be mainly explored in this paper.

The Application
of Piaget and
Bruner's
Cognitive-
Developmental
Theory in
Children's Dance
Teaching

Definitions

Cognition

Cognition by definition refers to an individual plays a role with the outside world via sensation, perception, memory, imagination, judgment, reasoning, thinking, and other known functions, through the understanding of a variety of things or nature of scenes existed in outside world in order to have a full grasp of the relations among these things and scenes or roles of rules as well as behaviors. Overall, the process of cognition includes the obtainment of mental skills, formation of knowledge, development of language, processing and application of information, high-level mental activities, and growth of mental structure, etc. In short, cognition refers to the process of how men "obtain the knowledge."

Piaget's theory of cognitive development

Piaget is best known for his doctrine by dividing the cognitive development of children into four stages: Sensorimortor stage, from birth to 2: experiences are obtained through senses. The concept of object permanence is developed at age 1 and have the ability to scheme; preoperational stage, from ages 2 to 7: language skill and symbols are present, reasoning skill is acquired but not logically, cannot conserve, cannot use reversible thinking, and very egocentric; concrete operational stage, ages 7 to 11: the concept of horizontal line is developed, can think by operating concrete objects; formal operational stage, ages 11 and above: analogy skill begins to develop, developments of logical and abstract reasoning.

Bruner's theory of cognitive development

Bruner believes that there are three modes of cognition for human, representing three stages of cognitive development and three different learning methods, which are enactive, iconic, and symbolic. Enactive stage: Representation is through actions on objects (for example: to touch, to taste) in order to learn about the world namely through results derived from actions to obtain experiences. Iconic stage: Representation is through images received from sensations on objects (for example, images of long, short, and

tall, etc) as well as to learn about the world, these images are used as an aid of thinking process. Symbolic stage: Representation is through words, languages, and abstract symbols (for example, dance terminology) to express cognition, which is also the highest mode of cognition.

Literature review

This chapter is divided into four sections, the first two sections will be exploring literatures related to Piaget and Bruner's theories of cognitive development for their theories will be used as the basis of this study. This paper intends to understand and quote the importance of children's body movement development and dance teaching for children in terms of cognitive development through related literatures and theories, and provide a theoretical basis of examining the dance curriculum exclusively for children by applying the cognitive theories to teaching principles. In addition, in order to understand the link between children's body movement development and cognitive development theories, the process of children's body movement development will be discussed in the third section to assist the implementation of this study.

Piaget's theory of cognitive development

Humans are animals possessed of thinking ability, able to take the initiatives to conduct a series of logical reasoning including understanding, reasoning, and judging, and the obtainment of these thinking abilities is generated through a series of long-term qualitative changes. By observing how children perform their thinking methods, such as highly imaginative, all things in the world are similar to humans, and must depend on actual operating experiences; children's mode of thinking is utterly different from the adult. In terms of various theories concerning such phenomenon, Piaget (J. Piaget, 1896-1980) is the best known for his research on cognitive development. He was a Swiss scholar, who spent most of his life studying the development of children and conducted the significant "theory of cognitive development", which laid him the guru status in the field of children's development.

The Application
of Piaget and
Bruner's
Cognitive-
Developmental
Theory in
Children's Dance
Teaching

Piaget's research placed importance on two major issues, "formation of knowledge" and "increase of knowledge" (Shengfeng Tu, 1991). He believed that the process of thinking is generated from proceedings from the concrete to the abstract, and his research on stages of the cognitive development describes types of frameworks for children at different ages. Because each stage of children's development is different, thus learning will be limited as well as learning patterns.

Piaget's four stages of cognitive development

Piaget believed that infants after birth would use innate behavioral patterns to react to the surrounding environment. As he/she encounters a situation, he/she then collates and deals with through some sort of corresponding cognitive structure, and such behavior is called "schema". Schema is not innate nor acquired through experience, but through a series of actions. In the process of adaptation to the environment, schema can achieve the expansion of knowledge through assimilation, accommodation, and equilibration. These behavioral patterns go through continuous integrations and form a network structure, which is called cognitive structure, and the cognitive structure changes along with the cognitive development of subject, and hence the "theory of cognitive development" will be formed via such a series of changes. According to Piaget's theory, cognitive development can be divided into four stages (Piaget, 1974; Inhelder & Piaget, 1958), characteristics of each development stage will be described hereafter.

1. Sensorimotor stage: Refers to the period from birth to age 2. In this stage, children are inclined to perceive the outside world through movements and behaviors for children must learn to adjust their senses, such as vision, hearing, and touch, etc., in order to form them into a single action or behavior. The major concept completed in this stage is "object permanence".

2. Preoperational stage: Refers to the period from ages 2 to 7. Children in this stage are able to form stable concepts by acting on objects, the most important developmental characteristics include the massive use of languages and symbols, features lie in concreteness, egocentrism,

focusing on certain details, and specious logic reasoning.

3. Concrete operational stage: Refers to the period from ages 7 to 11. Through a series of mental changes, the egocentrism occurred in the preoperational stage will gradually disappear, and children are more willingly to perceive from others' viewpoints. Able to disperse attention, observe relations among objects, perform logical reasoning, and form the concept of conservation. Contains the ability to reverse, solve specific and real problems but limited to the actual context of the moment; however, unable to perform abstract and text logical reasoning.

4. Formal operational stage: Children begin to enter into the formal operational stage after age 11, during this period children's cognitive development reaches the peak for the abstract reasoning is present. They begin to think reversely with logics, can operate thinking in concrete objects, and rationally implement abstract and correlative reasoning using objects.

Major aspects of Piaget's stages of cognitive development

Ideas concerning the stages of cognitive development are considered the most important part in his theory. Piaget's main aspects are described as follows:

1. Piaget believed that each stage comprises of a unique and basic cognitive structure. In other words, different cognitive structures show obvious class differences in how students solve problems in terms of cognitive performance.

2. Sequence of class development is fixed, cannot be crossed or reversed for Piaget called it the "invariant developmental sequence". Each stage is a must basis of the formation of later stage. All normal children must follow the sequence of development. Therefore, each stage is universal. However, fixed sequence does not necessarily mean every child is able to reach the formal operation stage at age 11. Cognitive development of each individual varies along with his/her won social experience, physical maturity, and physical experience.

3. Each stage is non-contact or static, but continuous developmental and overlapping. There is no sudden interruption or brand new start. Piaget

The Application
of Piaget and
Bruner's
Cognitive-
Developmental
Theory in
Children's Dance
Teaching

believed that an absolute beginning could never be spotted during the process of development for new findings were resulted from gradual differentiation or progressive coordination.

Teaching principles of Piaget's cognitive development

Piaget believed that an individual's cognition began to develop at infancy and manifest in childhood. The development of education derived though the basis of the theory was called "positive teaching." The main task for teachers was to inspire students, teachers should not only act the role of knowledge instructor, but an innovator and researcher, the purpose was to enable children to receive natural and comprehensive developments along with complete personalities.

In Piaget's theory, the cognitive development of children is initiative, he stressed that knowledge was the result from the interaction between cognitive individual and environment, which was continuous development and continuous construction during the interaction. By applying the theory to teaching, four principles in the followings will be resulted:

1. Have a full grasp of the characteristics of initiative learning: To design innovative, novel, and confirmative curriculum or teaching principles to stimulate children's potentials towards learning.

2. Match up the sequence the cognitive development of children: The sequence of the cognitive development of children is fixed, hence curriculum or teaching shall base on the cognitive structures in the development to promote the learning effect.

3. Make good use of cognitive conflicts: Refers to cognitive conflicts occurred as the incoming new knowledge is inconsistent with students' current cognitive structures. Hence the design of teaching must comply with children's developments of cognitive structures and to provide new curriculum accordingly, this way curriculum can be absorbed effective and become more challenging.

4. Adopt interactive principles of learning: Students should be allowed to communicate and exchange ideas with each other in order to establish objective cognition and enable the moral and emotions to go smoothly.

The International Journal of Arts Education

The Application
of Piaget and
Bruner's
Cognitive-
Developmental
Theory in
Children's Dance
Teaching

From the above, we may find out that cognitive development is structural, connected with a ring after a ring, it is seemingly independent, but in fact it connects with each other and affects each other. Children must go through the above-mentioned four stages and none can be skipped, but children will develop a series of procedures in different pace. Children require real understanding of learning, they cannot rely on teachers to understand the process of dance postures and developmental actions, but through themselves and spontaneous developments. Therefore, you must comply with children's cognitive development in order to help them learn how to dance, teachers must be familiar with the theory of cognitive development to arrange various structural and non-structural curriculum to go along with each stage of development, must know how to make use of reversal hints, an environment full of resources and a group bathing in the atmosphere of freedom are equally important, teachers need to provide the proper stimuli to promote students' cognitive abilities. In dance teaching, teachers must grasp the process of children's body development, understand their thinking process, master cognitive characteristics of children's learning, and design curriculum in accordance with children's ages and developmental stages.

Bruner's theory of cognitive development

Bruner (1915 -) is best known mainly for his contribution to education. In "The Process of Education" (Bruner, 1960), he claimed that knowledge of any subject could apply efficient teaching to any child at any stage of development via certain reasonable ways. He is an educational learning theorist, who conducts considerable contributions and enlightenment in the construction of educational theories that gives far-reaching influence on researchers concerning human thinking, learning, motivation, stages of cognitive development and knowledge structure, and modern curriculum and teaching (Yuyi Wu, 1996).

Bruner's stages of cognitive development

Influenced by Piaget's theory of cognitive development, Bruner as well conducted a number of experiments in terms of children's intellectual development. The contribution of Bruner's theory of cognitive development lies in helping people understand how children learn and be assisted to learn,

The Application
of Piaget and
Bruner's
Cognitive-
Developmental
Theory in
Children's Dance
Teaching

and he believed that mental information could be carried out by expressing completed tasks or things to do through the language, and selections and alternatives could be generated right away. Therefore, he took a further step to focus on the fields of perception, reasoning and thinking, cognitive characteristics, education, motor skills in infanthood and childhood. In the light of the cognitive development of children, Bruner proposed "three modes of representation", three processes of three types of step-by-step thinking mode, representing three stages and learning methods of the cognitive development respectively:

a. Enactive representation stage

The most common cognitive approach for children from ages 1 to 2 that they learn and understand about the world around themselves through movements and actions. In terms of the surrounding objects, children whether touch them with their hands or bit or lick them with their mouths. They tend to form associations with objects in the surrounding environment through actions like grabbing, pushing, taking, lifting, and walking, and acquire knowledge through explorative activities comprised of senses and motors, in his world, there were no specific differences between internal and external objects, hence he adopted an intuitive view and stored it first, and then make it into a movement skill later. Enactive representation is the basis of acquiring knowledge; although it first appears in early childhood, but can be extended to life-long.

b. Iconic representation stage

For children at ages 2 to 6, they learn through visual perceptions and can substitute explanations with pictures or imaginations of objects appeared in front of eyes, that is, children can express objects or things through iconic images instead of senses and controls of movements. Knowledge acquirement goes from the concrete to abstract in the image representation.

c. Symbolic representation stage

For children above 6 years old, in this stage children comprehend the world around themselves though language skills, works, and abstract symbols, are able to perform reasoning, and express using words, languages, or linguistic symbols as well as interact with the environment.

Bruner believed that these three stages coexisted in a parallel pattern and contained uniqueness, the relationship among them is complementary rather than replacing. As enter into the "iconic stage" from the "enactive stage", cognitive functions of movement representation still exist, and in the "symbolic stage", cognitive methods of various movements and images are included as well. In Bruner's view, the cognitive development of human has been proceeding by following these three stages. In fact, each of us continues to use these three modes of representation from time to time. In other words, we have at least three varied ways to express our learning and thinking, and if teachers could design the dance teaching curriculum in accordance with this approach, the purposes of promoting students' wisdom or cognitive growth could then be achieved.

The relation between Bruner's theory of cognition and curriculum organization

Bruner believed that education and cognitive development skills are closely related to each other; at the same time he emphasized that functions of curriculum structure could reach peak only through education and teaching. Therefore, he emphasized that education was the key of helping an individual to develop his/her mental skills; in order to bring out the efficiency of education, curriculum arrangement should be thought highly of. Hence, again and again he emphasized that the content of curriculum requires theories of cognitive development, structure of materials, and teaching methods (Licho Chen, 1985).

Bruner emphasized on the importance of "curriculum structure" in his theory of learning; therefore, Bruner proposed the spiral curriculum in terms of curriculum organizations. He was of the opinion that teachers must understand the cognitive structure of children, the design of curriculum should meet the cognitive method and correspond to cognitive approach, making students take the initiatives to discover the structural context, and designing new curriculum should be benefited to the cognitive approaches that children could find them easier to study, making students take initiatives to discover the content included in the textbook, and further to promote the individual's cognitive development as teaching methods should be applied to

The Application
of Piaget and
Bruner's
Cognitive-
Developmental
Theory in
Children's Dance
Teaching

stages of cognitive development in order to increase the effectiveness of learning.

Bruner discovered teaching methods and teaching principles

Bruner was of the opinion that by passing out and instructing knowledge cannot be regarded as complete education, we should let children explore, reason and think, solve problems, discover facts or principles, enjoy the happiness derived from learning results on their own in order to further cultivate the curiosity, encourage the creativity, and explore the unknown world in the future, as well as to cultivate innovative and responsible modern people (Lichao Chen, 1985).

Bruner emphasized that the important tasks for teachers are to teach children how to think and discover principles from activities of acquiring knowledge, and then integrate and summarize them and form it into their own experiences of knowledge. He proposed the "discovery learning theory", as the teacher instructed students to learn, the purpose was not to have them learn knowledge and facts of all sorts, but have them discover whether meaning-related structure exist among teaching materials and objects, and as children were familiar of "structure", due to it comprised of generality and categorization, larger effect of learning transferring could thus be generated, which could help children face other similar situations.

Bruner believed that the effective teaching environment should be available during teaching to stimulate students' curiosity and maintain their interests as well as to guide students to explore into the right directions. In Bruner's book "Toward a theory of instruction", which was published in 1966, he mentioned four principles needed attention when came to curriculum design (Bruner, 1966):

1. Best experience goes with intrinsic motivation

   Teachers should firstly understand the best experience of students' learning while presenting discovery teaching, the best experience refers to the purpose of orientation or problem solving in terms of students' learning needs; learning requires motivation, students must grow affections to learn in order to be willing to learn, thus effectiveness could be derived; therefore, during teaching activities, must provide room for

students to choose freely, and individual differences must be taken into consideration because the difficulty of materials varies.

2. Curriculum structure goes with cognitive structure

Regardless of the size of curriculum structure, the key lies in whether there is a good association between structures and such association is able to comply with cognitive representations such as movements, icons, and symbols in order to stimulate students' discovery to combine with images and information of the real world. As long as the curriculum structures matches up with the learning psychology of children, good effects can be achieved always.

3. Curriculum translation goes with the sequence of presentation

Curriculum translation means to transform the curriculum into movements, images, and symbols that students can percept, and the sequence of presentation refers to orders of time, logic, and objects. First to transform the curriculum into the basic knowledge which are acceptable for students, and then layer by layer, gets into newer and deeper knowledge day after day. The sequence refers to two meanings: one is "preparation", at the beginning of teaching, students' motivation and interests must be taken into accounts, once their motivation is stirred, their interests will remain, and once there is preparation, learning can be easy. Another meaning is "the use of curriculum teaching", Bruner's claim regarding such point was "spindle curriculum", on one hand it matches up the sequence of cognitive development of children, from the concrete to the abstract, from the simple to complex, from the movement to symbol; on the other hand, it matches up the characteristics of curriculum, the design of discovery teaching process is similar to the concept of spindle curriculum, that is, the context goes from the simple to difficult, the wide to the narrow, and keeps rising like a spindle. So, it not only matches up children's age abilities, but helps the new experience connects with the old one, thus learning efficiency increases.

4. Learning strategy goes with enhanced constraints

Strategies regarding how to increase learning efficiency should be pointed out concretely, Bruner was of the opinion to reduce the "external reward" because students were restricted within certain enhanced parts

The Application
of Piaget and
Bruner's
Cognitive-
Developmental
Theory in
Children's Dance
Teaching

and would influence the satisfaction derived from the "inner reward." Bruner also emphasized that children took initiatives to learn due to the curiosity or the satisfaction of fulfilling the curiosity. To believe in adopting inspirational approach during teaching, the role of a teacher during teaching should be a guider that helped students discover the principles by themselves and gain self-satisfaction through perception and understanding, this way, learning activities would certainly be enhanced.

According to the above-mentioned theoretical research conducted by Bruner, every subject contains basic principles, concepts, and structures, as long as the teacher can present the structure of curriculum, he/she then can help students understand principle of such subject and percept the new structure in order to achieve the purpose of learning transferring. In dance teaching, the teacher should continuously provide combinations of different dance movements, styles, or examples of real performances, which can have students take initiatives to think, understand, and discover the mutual relationship and knowledge structure between examples, concepts, and principles. Dancing is linked by elements – time, space, strength, relation, it is integrated into an organic body, and if the teacher can highlight these elements during teaching, students can be led into the inner beauty of dance.

Motor development in children

The body is the tool humans rely on to survive and act, for it is the most intimate but also the most often ignored. Since birth, a baby begins to learn to move his hands and feet to control the body, and as the infant learns how to control his/her body, he/she begins to know and explore the world through movements. Motor development originates from the expression of oral language, is the basis of all learning and discovery (Chuhsi Pao, 2010). The infanthood is the prime time when infants develop relevant movement experiences through exploring, and movement experience is an important perceptual experience for it helps infants acquire aesthetics and balance of skills during the process of development. Children then develop along with body movements, explore and store useful movement experiences in the

environment and express their needs and feelings through movements, through learning to being familiar with movements and achieve an overall movement development.

Since birth, along with time, the infant gradually begins to the muscles and bones of his/her body and dominate efficiently his/her movements, operates surrounding objects, learn all sorts of movement skills to achieve the process of using body movements, it is called the motor development, as the fundamental body skills are slowly forming during the process of development. Table 1 shows the movements children at different ages correspond to. Table 2 shows the development of body movements of children from birth to age 2. According to these two tables, we may find out that infants before age 2 are only capable of not yet fully developed fundamental movements; therefore, most children start to learn dancing at age 3 or above. The motor development in childhood belongs to fundamental skills, continue from not fully developed movements, through integration, complex and delicate movements will then be formed in the future.

Table 1　Age and motor development

Motor development	Corresponding period	Age (years)
Reflex movement	Newborn	0-1
Undeveloped fundamental movement action	Infant	1-2
Fundamental movement action	Early childhood (preschooler)	2-7
General movement action	Middle childhood	7-10
Special movement action	Late childhood	11-13
Specialized movement action	Youth and adult	14 above

(Source: Prepared bvy Gallahue, 1976; Yungkuan Huang, 2009)

The Application
of Piaget and
Bruner's
Cognitive-
Developmental
Theory in
Children's Dance
Teaching

Table 2   Motor development from birth to age 2

Age	Motor development
Birth to age 1	· The brain is not yet fully developed, but more mature compared to hearing, vision, touch, and other perceptions. Sensitive hearing, but the vision is not yet fully developed. At three months, eyes move along with slowly moving objects in the environment. · At 2 months, may begin to control the head, can lift the head up in the prone position, but head lifting, supine position, and rolling over need to wait until 5 months. At 7 and 8 months, can sit by him/herself, at 11 months, can stand up by holding onto something, at age 1, can stand or walk by him/herself. · At 4 to 6 months, the small-muscle development can be developed slowly through grabbing, throwing, pushing, and pulling. At 8 to 9 months, can operate toys using both hands, grab things using index finger and thumb; at age 1, the use of the thumb and index finger is more flexible.
Ages 1 to 2	· The child can sit on the chair by him/herself, can walk very well and climb the stairs by holding on to the handle of staircase at age 1 and 1/2. · Can eat by him/herself using the spoon and fork, can hold the glass and drink, can repeat simple movements by imitating adults, such as throwing balls and stacking wood. · Roughly at age 2, running may start to appear, but not very well-organized, can stand up, jump upward or forward.

(Source: Ministry of Education, 2007)

Table 3 shows the general patterns of motor development in children, providing teachers as the reference in designing the curriculum. At the meantime, children's movement skills can grow along with the body development, but the maturity only determines that infants can only engage in low-level movement actions. If you wish to take a further step to promote the infant's performance level and movement skill, then continuous practice and instructions are necessary (Cleland & Gallahue, 1993; Gallahue, 1993; Seefeldt, 1984; translated by Yuehkuei Hsu, Hsinhsin Cheng, Chingying Huang, 2000).

Table 3 General patterns of the development of movement skill in children

Age	Large-muscle movement skills	Small-muscle movement skills
Ages 2-3	1. Can walk by him/herself 2. Can run vertically 3. Can jump using both feet	1. Draw circles by following lines 2. Use dining utensils 3. Stack up simple building blocks
Ages 3-4	1. The pace distance reaches 80% of which of adult 2. The speed of fast running reaches 1/3 of which of adult 3. Hop at the starting place 4. Climb vertical stairs	1. Button and unbutton 2. Draw and sketch according to pictures, such as to draw a cross or mark by him/herself 3. Copy his or her own name
Ages 4-5	1. Maintain at balance on one leg 2. Control the body while running 3. Ride a bike to detour round the obstacles 4. Jump 7 to 8 times within 5 seconds using both legs 5. Climb up and down the stairs by stepping on one ladder after one using one foot each, running, jump forward 6. Amazing actions of body movements, such as spinning, shaking, and tumbling, etc	1. Use scissors to make straight and curved lines 2. Stack up complex building blocks 3. Learn numbers and letters 4. Make knots using ropes 5. Button and unbutton
Ages 5-6	1. More advanced movement skills as well as durability and agility 2. Toe balance standing for 10 seconds 3. Rhythmic jumping using both legs, such as: jumping rope, hopscotch, tricky climbing 4. Go backwards vertically, gliding	1. Number skill is much more accurate compared to age 4, but still uncertain about the concept of the amount of number 2. Can use the thumb to touch other four fingers in sequence 3. Can draw triangles

(Source: Hsunfen Li, 2002)

From the fetus to the infant, the most obvious patterns of the development of physical movement are: 1. Development from the head to limbs: start from the head, shoulders, and hands and feet; 2. Development from the center to the edge: first the torso, then the limbs; 3. From whole to the specific, the whole body to simple large-muscle activities, then to the partial, particular small-muscle activities (Chunhsing Chang, 2001; Wanyi

The Application
of Piaget and
Bruner's
Cognitive-
Developmental
Theory in
Children's Dance
Teaching

Yang, 2004) should be taken into consideration in terms of dance teaching for children. Because body movement comprises of sequence and phases that it affects functions of the next phase. In terms of dance curriculum, if curriculum design could follow the development of children's body movement as well as the cognitive development, making it covers three teaching goals including motor skills, cognition, and affections, children will for sure be healthy, confident, and happy.

The association between cognitive development and dance movement for children

Most educators acknowledge that childhood is the period when the highest wisdom and creativeness can be established for an individual. Famous cognitive theorists like Piaget and Bruner, their educational theories are recognized world-widely, especially for later researchers while they are engaging in planning, organizing curriculum and presenting teaching (Liching Huang, 2009). In the "sensorimotor stage" among Piaget's four stages, he already pointed out that children experienced the world through movement and senses, that is, through senses and movements to express the schema; In Bruner's "enactive representation stage", he pointed out that objective information could be stored through movements instead of thoughts. In other words, experiences of body movements help children accumulate knowledge, and dancing can nurture such body experience. This chapter will analyze the relationship between Piaget and Bruner's stages of cognitive development and dance teaching for children.

The association between Piaget's stages of cognitive development and dance movements

In Piaget's "theory of cognitive development", characteristics of chidlren's behaviors vary by different stages, children at different age are able to manage different dance movements, and experiences acquired vary as well. Characteristics of children's behavioral development and dance movement cognitive experience will be described and analyzed based on Piaget's four stages of cognitive development.

Table 4 The relationship between Piaget's stages of cognitive development and dance movement experience

Age	Piaget's stage of cognitive development	Characteristics of children's behavioral development	Dance movement experience
0 ↓ ↓ ↓ 1 ↓ 2 ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓	Sensorimotor stage	To know the world through senses and movement. Infants interact with the environment through senses, for things they do not see, they consider them do not exist.	• Crawling and sucking • Body swinging or turning the head to respond to the stimuli • Repeat operational actions • The hand-eye coordination is developed • Mimic behavior begins to occur • Percussion, clapping • Dance along to music • Do movements by following adults • Dance in the air, jump, run
3 ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ 4 ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓	Preoperational stage	Language and perception development rapidly, learn to use imagination and language instead of senses and movement.	• Walk, run, and jump along to music • Start all over again suddenly, stop and change direction, walk on the toes, learn to run fast • Perform rhythm along to special music • Clap hands appropriately or step to repeat the rhythm • Able to wait a short period of time • Able to combine movements freely • Tend to choose important experiences according his/her own wills • Able to jump, run, and other displacement movements • Possess better movement control • Able to engage in dances or games with rules • Able to respond to body activities designed by adults

5 ↓ ↓ ↓ ↓ ↓ ↓ ↓ 6 ↓ ↓ ↓ ↓ ↓ ↓			• Possess very good movement control • Learn simple dancing steps, elegant, coordinated performance, more accurate movements • Run and jump energetically • Very familiar of throwing and casting • Perform movements along to special musical rhythms • Prefer regulatory songs and dances • Prefers structural activities
7 ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ 11	Concrete operational stage	To being to apply logical reasoning to concrete problems, concept of reservation is present, thinking pattern of from the general to the classified, the absolute to the corresponding, the static to the dynamic.	• Begin to develop jumping skills • Able to stay with the beat, clap hands to respond to music • To move along to music, respond to changes of music through rhythms • Able to read dance terminology • Interested in regulatory dances and music • Enjoys dancing together or other dances involve classmates • Able to compare more than three dancing styles and movements • Enjoy to engage in group activities
↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ 15	Formal operational stage	Has reached the prime of cognitive development, begins to perform logical reversed thinking, able to think in the concrete objects, and able to perform abstract and correlated reasoning rationally.	• Transform the single dance movement into complex and dance sentence • Accumulation of movement ability, more stable and durable • Emotions are added into dancing

The association between Bruner's stages of cognitive development and dance movements

In Bruner's theory of cognitive development, he conducted "three modes of representation" by exploring the fields of perception, reasoning, cognition representation, education, and motor skills in infanthood, and through the system children tend to store repeatedly obvious behaviors occurred in the external environment via a method that is easy to grasp. Table 5 shows the relationship between Bruner's stages of cognitive development and dance movement experience

Table 5   The relationship between Bruner's stages of cognitive development and dance movement experience

Age	Bruner's stages of cognitive development	Characteristics of children's behavioral development	Dance movement experience
Ages 1 - 2	Enactive Representation	Infants under age 3 operate through movements and operation on objects (such as, touch with hands, taste with mouth), in order to identify the world around them and acquire knowledge experience	· Express the world they have understood and sensed through movements · Express people, things, and objects they have seen through mimic behaviors · Describe the music they have heard through postures or dance movements · Organize the meaning of dance through improvisational dance
Ages 2 - 6	Iconic Representation	Children have grown, are able to use imaginations, pictures, or icons to understand the world and use them to help them think	· The imaginative skill between spiritual imaginations and real imaginations gradually grows · Transform icons into movements after seeing icons presented through dancing · Organize the idea of dance based on the

			• icons he/she creates • Choose appropriate icons, develop icons by him/herself, or describe the dance he/she has seen using other imaginations
Above age 6	Symbolic Representation	As the thinking development grows mature, children are to express their perceptions through medias like words, languages, abstract symbols, logical reasoning and abstract reasoning are present, this is also the highest form of perception.	• The linking ability of concepts and symbols of dance gradually grows • Able to use symbols and dance terminology to describe dance movements • Transform the abstract symbol into dance movement • Record the dance ideas through movements

According to the above two tables, we may find that behavioral characteristics and process of body development of children vary along with different periods, the development of dance movement experience contains specific patterns and sequence, although differences exist among individuals, but overall, tables are still available for references.

The application of the theory of cognitive development to the design of dance curriculum for children

In "Art Education, Teacher's Manual – Elementary Dancing Class", it clearly points out the meanings and functions of dance education for children. In the process of growing up, children explore and learn through continuous activities and stimulate their physical growth. In order to achieve a balance of physical development, children are thirst for body movements since birth, and it must be met. The living environment in terms of physiological and psychological developments for children is a multi-changeable and unstable situation, all sorts of learning help establish order in children's lives and

The International Journal of Arts Education

The Application
of Piaget and
Bruner's
Cognitive-
Developmental
Theory in
Children's Dance
Teaching

among which only dancing requires physical postures to express directly, and it brings great benefits to the establishment and promotion of self-worth and self-confidence.

If you wish to teach children to learn knowledge and solve problems through thinking without having a grasp of understanding of children's thinking method and differences in each stage in terms of cognitive methods, results can be poor; therefore, to design appropriate curriculum in accordance with developmental characteristics are very important. In the following, the researcher will provide suggestions applicable to dance curriculum for children in accordance with Piaget and Bruner's theories of cognitive development.

Application of Piaget's theory of cognitive development to the dance curriculum for children

a.   Sensorimotor Stage: Infants obtain the initial movement experience in this stage and establish a data base of body movements in their brains as the basis of further development. May refer to the followings for the design of teaching activities:

1.   Present the "imitation game". Have adults imitate children's body movements and have children try to repeat imitations adults have just performed.

2.   Present the game, "discover the body". Help children explore, find, and discover sources of movements, including movements performed by themselves at the beginning and different body movements in different environments, which can make them touch different body parts, try different movements interesting styles.

3.   Provide rich sense experience: Set up an environment fulfilled with music, rhythm, and beat, use this environment to cultivate children's perceptual ability; develop dance movements along to music, and sing the music to children often to help them add body movements.

4.   Add new and simple movements to original body movements in accordance with appropriate conditions.

b.   Preoperational stage: In this stage, the thinking ability containing symbols is present, hence children are able to accept and understand

The Application
of Piaget and
Bruner's
Cognitive-
Developmental
Theory in
Children's Dance
Teaching

the combination of concepts of dance movements and symbols. Children dance in accordance with their own perceptions, although they are able to imitate or express themselves through imaginations, but individual meanings are present. Refer to the followings for teaching activities:

1. Children in this stage are egocentric, so they cannot think from others' views; therefore, individual body dance movements are recommended, such as dance in turns or simple dance games.

2. Present the game, "dance along to music", which can train children to discover different body dance movements through differences in the voice and music.

3. While presenting dancing elements to children in this stage, try to use visual and touching aids as hints, select simple examples, reduce the complexity to the lowest level, have students focus on the concepts of dance movements they are about to learn.

4. Children in this stage are lack of concepts of conservation, as the pattern or beats of dance movement change, but the actually quality remains the same, children are unable to understand the quality and quantity actually remain the same. Such as, same dance movement with different repeated section or direction change, it is very difficult for children in this stage.

c. Concrete operational stage: Children in this stage can identify different dance patterns or styles; in terms of class ballet and folk dance, dances from different countries, they can tell the differences easily. Combine the old and new experiences in terms of teaching, perform further learning. The context of curriculum can include repeated practices and memory guidance. Refer to the followings for teaching activities:

1. Due to the concept of conservation, children are able to identify differences in dance patterns and styles, and further describe and analyze. Add dances of different style from time to from, use it to train the self-adjust ability, provide more options for children to express themselves.

2. Able to arrange continuous characteristics, such as: slow action – medium speed action – fast action. Have students practice individually or divide them into groups, encourage them to be creative. Design a

combination of dance movement containing continuous characteristics using the knowledge they have already had.

3. Provide different types of music or beat to go with the dance curriculum and movement design timely, have children perform different levels of dancing.
4. Arrange dance performance observation, children in this stage are able to understand and percept the beauty of dance.

d. Formal operational stage: Children in this stage are able to enjoy the dance because abstract reasoning and conceptual activities have added timely, so they begin to break free from perceptual limitations to perform interpretational thinking. Through interactions among psychological states, emotion, and metal ability, individual uniqueness grows rapidly, and future goals thus are established. Refer to the followings for teaching activities:

1. Do not ask students to follow movements assigned by the teacher completely, let students have space to express themselves freely. Add the practice of "dance improvisation" into the curriculum, encourage students to think diversely, and support unordinary ideas proposed by students.
2. Provide time for students to discuss and exchange ideas with classmates and the teacher, enable them the opportunity to experience contractions in their ideas and listen to others' ideas.
3. Have students engage in different dance lessons or movement elements, cultivate the perception of dance styles, and teach them the origins and changes of different dances, different cultures, different patterns at different times, and concepts of choreographer's ideas, etc.
4. Invite domestic and foreign dance group or instructor to the class to present a demo in order to expand students' perspectives.
5. Arrange regular evaluations or performance day, and use it to see whether the curriculum achieves goals of skills, cognition, and emotions.

The Application
of Piaget and
Bruner's
Cognitive-
Developmental
Theory in
Children's Dance
Teaching

Application of Bruner's theory of cognitive development to dance teaching for children.

Although Bruner divided the cognitive development into three stages, but during the actual teaching, he did not insist on using these three modes of representation to teach, but the individual difference and teaching context should be taken into account in terms of teaching sequence, the individual difference refers to the learning pace, that is, children at the same age in terms of the knowledge experience, particularly in knowledge acquiring, significant individual differences exist; the context of teaching needs to meet the stages of cognitive development. Therefore, in this section, suggestions will not be addressed in accordance with stages of cognitive development, but the application of Bruner's principles of teaching design to dance teaching for children, as reference for teachers while designing dance curriculum.

The principle of motivation

Capture children's curiosity and stir up their learning motivation help teaching reach its goals. Refer to the following suggestions for how to stir up motivation:

1. Add the "story guide" into the curriculum, which helps link the context into a story. Every time a movement is completed, story continues; have children do role-play through dance according to the story approach, or have students make up stories by themselves that they can dance while telling stories, this way, they can fully express themselves.

2. Attract students' attention using props. Because students can touch them, containing multiple selections and changes, that they satisfy students' curiosity and passion of exploring. Use supplementary aids such as hula hoops, balls, ribbons, sponge mat, not only to expand students' learning field, but different motivation can be generated as well.

3. "Background setup". Children are adventurous and are courageous to accept challenges; therefore, set up a suitable background helps children take initiatives to participate and blend into the curriculum rapidly.

The principle of structure

Children's ages, levels, individual perceptual development must be taken into account in terms of designing suitable curriculum, and the structure should be conducted the way children can understand, and have children to discover in the process of learning by themselves. For example: choreography of dance lesson for Preschooler S must begin with simple walking, running, and jumping; afterwards, pause can be added into a series of single actions, and at the same time children will learn to be patient; after that, you may try to have them choose and combine movement by themselves, as well as to add other displacement movement; and then enhance children's body control ability and perform dance games with rules (such as hopscotch), or you may use different songs or music with choreography.

The principle of sequence

Design the dance curriculum using the "spindle curriculum". First of all, determine teaching goals, the context of teaching must focus on key points you have planned to achieve the learning efficiency. And then, determine learning concepts and principles, follow representations of movement, icons, and symbols, then increase the difficulty by moving forward in sequence to expand and deepen the learning experience. The arrangement of curriculum should begin from the slow to the fast, the shallow to the deep, the simple to the complex, remember, do not rush, in order to prevent dancing injuries. For example, in the class of first stage, children's movements are derived from imitations and following, you may design a few simple movements (walking, running, and jumping), and practice the movements repeatedly; in the class of second stage, use picture cards or stories to guide students to organize their own dance movements using movements they have learned from the previous class; in the class of third period, children need to learn to describe dance movements using symbols or dance terminologies.

The principle of enhancement

The teacher must set up teaching goals, provide diverse evaluation methods, and evaluate students' performances via observation, record,

The Application
of Piaget and
Bruner's
Cognitive-
Developmental
Theory in
Children's Dance
Teaching

performance, and chart. Avoid the "external reward", use the "internal reward" instead to enhance the learning efficiency. For example, give students little rewards after class (stickers, stamps, candies); before the class is over, the teacher can give a warm hug to every student; a cheerful, warm smile or a compliment; make a little wish after achieving the goal. Once the teaching goal of every stage is achieved, you may present a performance day or little quiz to determine the effect of implementation and places needed improvements.

Conclusions and suggestions

The main purpose of this study is to explore Piaget and Bruner theory of cognitive development in teaching children dance. By collecting Piaget and Bruner's theories of cognitive development and literatures related to teaching principles, understanding the importance of the association between children's dancing and theories of cognitive development, further applying these theories to the actual dance teaching for children. Conclusions will be described in the following, and suggestions will be provided hereafter.

Conclusions

a. Based on Piaget and Bruner's theories, developmental characteristics of children's behaviors in different stages, dance postures children can manage at different ages, experiences acquired may vary accordingly. The researcher believes that if teachers can have a full grasp of corresponding behavioral characteristics in terms of each stage of cognitive development, they are considered of having sufficient knowledge background and can choose dance postures and movements for children at any age and design suitable curriculum.

b. "To learn the appropriate things at the appropriate time" is the best learning strategy. According to Piaget and Bruner, learning to dance begins in the early stage of children's development, through actions and behaviors to explore the world around them, and these become the basis of dance movement in the early period. Teaching methods shall serve the

purpose of inspiring learning interests, establishing correct learning attitudes and methods, not the amount, speed, and efficiency. Therefore, children's cognitive level and overall development shall be taken into account towards dance teaching curriculum, and curriculum should be designed in accordance with theories conducted by two scholars as well as should meet the process of cognitive development of children, step-by-step teaching mode, and systematic instruction, for this is the key of happy growing up for children in the future.

c. By applying the theory of cognitive development to the dance teaching for children, we may find out that "the individual" is the first priority in the teaching curriculum, including cognitive development, creativity, imagination, individual thinking and ideas, during the process of learning, teachers should encourage and reward students more often, cultivate children's self-confidence and creativeness, and promote potentials of initiative learning; as for teachers, during the process of teaching, in addition to observe students' body movements from time to time, must ensure the safety and property of teaching, as well as take children's innate abilities and needs into account, match up children's cognitive development stages to design step-by-step curriculum, and adjust the progress accordingly. At the meantime, must increase interactions among teacher-students and classmates, through communication and interactions with others to construct concepts of self-awareness and physical and psychological developments.

d. In terms of the design of dance teaching curriculum, theories of cognitive development do have considerable importance. The curriculum should base on the stages of cognitive development of children as well as their physical psychological status, via more diverse teaching mode to train body movements, and the curriculum should be designed by focusing on inspiring children's curiosity and imagination, this way, not only teachers can have a full grasp of understanding of children's cognitive development and learning efficiency, but teaching will become more smooth and efficient in order to reach the state of appropriate teaching; as well as to enable children to learn to use their bodies, express their emotions, gradually master the performance of dance techniques, feel the

joy generated from self-confidence, and help them learn the ability to explore through dance performance, to create a happy environment and have them learn and grow happily.

Suggestions

Based on the perspective of dance teaching for children, this study explored how to apply the cognitive development of children to the design of dance teaching, in the section of literature discussion, the theory of children's cognitive development was used as the basis, and suggests were provided according to developmental stages and teaching principles. Limited by the ability of the researcher, researchers who are willing to work on the topic are needed. Suggestions provided in accordance with the review and results derived from this study are available for the use as reference for teachers and individuals engaged in the field of dance teaching.

a. The association between the theory of cognitive development and dance teaching for children mentioned in this study, as well as the reference of dance curriculum design, can be used as supplementary materials to assist the current curriculum used in children's dancing class, children's dancing talent, or relevant educational course, to see whether the curriculum used at present comply with the cognitive development of children, or may construct new curriculum accordingly.

b. The dance teaching curriculum constructed in this study was mainly based on Piaget and Bruner's theories of cognitive development. The researcher suggests that may combine theories from different scholars or theories of movement structure development, or may further refer to psychological development to promote better and more comprehensive dance teaching curriculum for children.

c. In the future, the dance curriculum for children may base on the theory of cognitive development and teaching principles, and to apply them to the actual teaching, and carry out evaluation after implementations, which can reveal problems and efficiency of the curriculum design for further use in the future.

The Application
of Piaget and
Bruner's
Cognitive-
Developmental
Theory in
Children's Dance
Teaching

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The Application
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Bruner's
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Theory in
Children's Dance
Teaching

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The Application of Piaget and Bruner's Cognitive-Developmental Theory in Children's Dance Teaching