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Connections between the constructivist-based models for teaching science and music

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Abstract

In the area of education, there are a number of models of teaching based on constructivism reported in the literature. Three-stage model, 4E model, 5E model and 7E model are only four of the application types of constructivism into classrooms. 'Orff approach' and its learning stages is also very common model used in education especially in music classrooms. In this article it is aimed to present some of the constructivist-based teaching models used in science education and 'Orff' learning stages in detail and make connections among them to provide sources for teachers to help students learning in a constructivist way.

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Keywords: Constructivism; learning cycle; music education; orff approach; orff learning stages .

1. Introduction

Constructivism is an approach for teaching asserts that learners construct understanding for themselves, based on their experiences. Under constructivism, the learner thinks about his or her own experiences, beliefs, and views and personally constructs meaning to acquire knowledge. As cited in a book called *Science for all Children*, Susan Sprague said "The constructivist model of learning contends that each student must build his or her own understanding. In such a process, understanding can never be completed. Each student must work through his or her own path toward deeper and deeper understanding skills" (Sprague, 1995, cited in National Science Resource Center, 1997).

There are a number of models of teaching based on constructivism reported in the literature. One of these models is known as "the learning cycle" developed from a theoretical support from the cognitive development theory of Jean Piaget (Renner & Marek, 1988). Learning cycle can also be defined as a "method for planning lessons, teaching, learning, and developing curricula" (Martin, Sexton, Wagner, & Gerlovich, 1998). There are different types of models that are considered as common application types of the learning cycle used into classrooms. Three-stage model, 4E model, 5E model and 7E model are four of them. These models are frequently used under constructivist classrooms especially in science education.

When music education methodologies recall, the contributions of Carl Orff, composer and a music educator, are treated as the best applied approach all over the world. In his approach, Orff developed his learning stages to help youngsters to construct meaningful understanding in music. 'Orff approach' and its learning stages are commonly used models in music classrooms and accepted all over the world. Therefore, in this article, it is aimed to present some of the constructivist-based teaching models used in science education and 'Orff' learning stages in detail and make connections among them to provide sources for teachers to help students learning in a constructivist way.

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2. Constructivist-based Teaching Models: The Learning Cycle

As it is stated before, there are number of models of teaching based on constructivism. One of these models, learning cycle, originated by Robert Karplus, a physicist at the University California at Berkeley, in the late 1950s (Marek & Cavallo, 1997). Karplus and a team of scientists and educators designed and developed a program for the use of discipline of science and formulated three phases important for teaching science. These phases are: “preliminary exploration,” “invention,” and “discovery,” later renamed “exploration,” term introduction,” and concept application” (Marek & Cavallo, 1997). This teaching procedure originally developed for use of science education basically consists of these three essential phases. Therefore the “three-stage model” is considered as the basic structure of the learning cycle teaching procedures. On the other hand, later researchers have extended three-stage model into four, five and seven stages and as a result, 4E, 5E, and 7E teaching models revealed (see Table 1).

Table 1. Teaching models of Learning Cycle

Three-Stage Model	4E Model	5E Model	7E Model
1. Exploration	1. Exploration	Enter/engage	Excite
2. Term Introduction	2. Explanation	Explore	Explore
3. Concept Application	3. Expansion	Explain	Explain
	4. Evaluation	Elaborate	Expand
		Evaluate	Extend
			Exchange
			Examine

Since three-stage model was the original model, it would be better to look deeper into these stages:

2.1. Exploration

This is student-centered phase of the learning cycle. It is typically hands-on activity phase which students gather and record data from their observations and experiences (Türkmen, 2006). In this phase, students interact with materials and each other. The role of teacher is to provide directions and materials, to answer and ask questions, to give hints and clues to keep the exploration going. So, “the teacher plays a role of facilitator, observing, questioning, and assisting students as needed” (Gega & Peters, 1998).

2.2. Term introduction

This is a teacher-centered phase of the learning cycle. The teacher works with students to develop vocabulary and introduce the scientific terminology for the concept. Basically, the role of teacher in this phase is to name things and events.

2.3. Concept application

This is activity-oriented phase of the learning cycle and it is, again, student-centered. In this phase, students are allowed to apply learned information to new situations. This is a good time for students to practice their new knowledge. The teacher should insist that the students use the newly learned terminology on their applications.

In this article, the author utilizes three-stage model in detail to give the idea of what learning cycle is based on. Application of other models (4E, 5E, and 7E) is not mentioned in depth in this article but readers should keep in mind that the main philosophy of constructivism applies for the other models as well.

3. Orff Approach and Its Learning Stages

German composer and music educator, Carl Orff, lived between 1895 and 1982, originally developed his philosophy of teaching music in 1920s and his philosophy became a common application in music teaching all over the world since then. Orff believes that learning is an active process so children should learn by doing – “by interacting with their environment and acting upon it through exploration and experimentation, play and discovery” (Stauffer, n.d.). Frazee states that “the ultimate aim of Orff’s approach to music is the enrichment of students’ lives through development of their inherent musically” (Frazee, 1987). This same goal is stated by all other music educators but what makes Orff approach unique is the emphasis of learning musical behavior through creating, listening and performing. Especially creating is very important in Orff Pedagogy as a result it aims to develop musically independent children.

As emphasized frequently in Europe, the principal components of Orff classroom are imitation and exploration of music with opportunities to improvise original pieces. So, learning can be conceived and practiced through the stages of imitation and exploration with the emphasis of improvisation. When Orff approach is adapted in the United States, it is extended to four stages and that way learning is experienced through imitation, exploration, literacy, and improvisation/creativity (see Table 2) (Campbell & Kassner, 1995). Orff learning stages become a great source for music teachers adapted Orff philosophy in their classroom.

Table 2. Orff Learning Stages

1.	Imitation
2.	Exploration
3.	Literacy
4.	Improvisation/Creativity

3.1. Imitation

This is a stage for preparation of the materials will be learned. It is a student-centered stage and teacher serve models for students. Students, especially the youngsters, are very good at imitating what they see and hear from the very young ages. Imitation activities are primary means of helping students of all ages and abilities to develop and build aural skills. Imitation may occur to develop skills in rhythmic speech and body percussion, in rhythmic and free movement through space in singing and playing instruments. Activities like movement, singing, speech, instrumental play are favorite imitation activities to share new information and develop new skills. Students actively involved in the process of music making in this stage. They don't recall what they do. They basically, enjoy and experience the new materials. Teacher's role in this stage is important as to serve as accurate and expressive models.

3.2. Exploration

This stage is for discovery of the possibilities available in both sound and movement and become another key process of Orff approach. New materials are not introduced in this stage. Students are given opportunity and time to explore the musical materials and are encouraged to find new ways to use what they are learning by altering known elements. This is an important step toward improvisation. The role of teacher is to encourage the students to participate the composition process by exploring the elements of music. "Orff classrooms are alive with the sense of discovery because students are constantly being challenged to manipulate musical ideas in original ways" (Frazee, 1987: 29). Teacher is the observer and facilitator in this stage.

3.3. Literacy

Orff valued music literacy in his approach but he did not propose a rigid structure for developing music reading. Orff believed that teaching musical symbols and music literacy should come after active involvement to music. Children first have to experience the language of music and they have to learn to speak in music. Then they can be taught the symbols of what they've learned. This can be most successful way to develop musical literacy so it can be integrated with and becomes an extension of making music rather than an end in itself. So, after students experiment and explore the musical concept, they name it in this stage.

3.4. Improvisation/creativity

After building their skills by imitation, exploring, and reading and writing, students need to create their original works. Creativity most often comes in the form of improvisation that is described as the extension of the skills mentioned previously. This stage, then, explains the use of knowledge and experience in a new invented form. Students invent new musical ideas and when they apply their previous musical experiences into new settings, then learning become more concrete. In this stage, students are given opportunities to demonstrate their musical independence from the teacher.

In summary, it can be said that Orff approach is constituted the means for learning in the active approach to music education along with improvisation and creation. Orff approach is not a prescribed approach to music teaching and learning but it is a dynamic process to help students experience and learn music. As in the constructivist approach, students learn music by establishing the knowledge to the previous knowledge. Teachers should aware of to follow the general rule "sound before symbol" when using Orff approach in their teaching.

4. Connections between Learning Cycle Models and Orff Learning Stages

Constructivist teaching approaches include "learning cycle" developed is a process that provides an excellent approach for planning effective instruction into classrooms and helps students to learn meaningfully. It is one of the effective teaching models practiced frequently in science instruction. Orff approach is also an effective process used in music classrooms to teach music meaningfully. As it is explained previously, learning cycle is originally developed in three-staged form but it is later extended into four, five and seven stages. Among these models, the original three-stage model is taken as a model in this article to constitute an example for learning cycle. Mentioned earlier, teaching procedure of three-stage model of the learning cycle is "exploration, term introduction, concept application" whereas Orff learning stages are "imitation, exploration, literacy, improvisation/creativity" (see Table 3).

Table 3. Three-Stage Model of the Learning Cycle and Orff Learning Stages

Three-Stage Model	Orff Learning Stages
1. Exploration	1. Imitation
2. Term Introduction	2. Exploration
3. Concept Application	3. Literacy
	4. Improvisation/Creativity

Learning cycle models used in science education and Orff learning stages used in music education have some common structures so the connections can be made between them. Generally, both of these learning approaches are the samples of constructivist philosophy so they are considered as approaches to construct understanding based on experiences of the learners themselves.

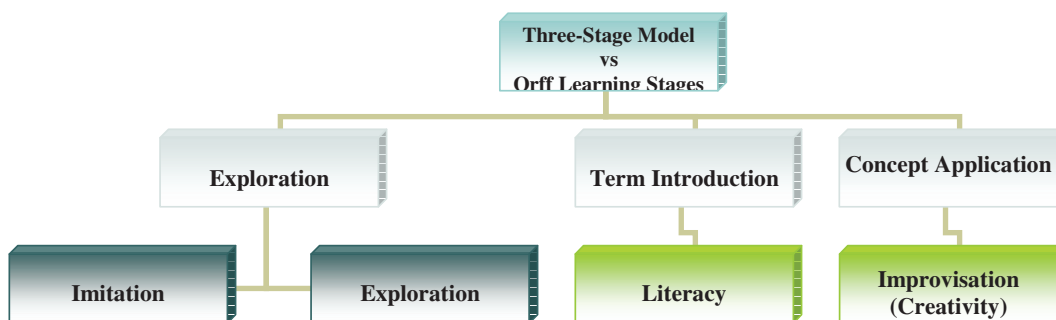
To make more specific connections between these two models, we can look for individual stages and can talk each of these stages. For instance, when we look at the Orff learning stages, we see that “imitation” is the first stage which can be considered as the preparation of the concept before students explore, discover, and apply. As we look at the three-stage model of the learning cycle, connection can be made with the “exploration” stage listed as the first stage in the learning cycle. If we look deeper into the definition of the “exploration” stage, we discover that students are expected to engage firstly with the activities then they are expected to explore and discover the knowledge. So, this can be called as a preparation stage of the three-stage model of the learning cycle as well and it can be similar in that way to the “imitation” stage of the Orff learning stages.

In Orff learning stages, the second stage called “exploration” as it is listed as a first stage of the three-stage model of the learning cycle. Basically, the terminology is the same and it also puts the same meaning into the learning approach. Students in both of these approaches are aimed to explore the knowledge by doing it. Usually, in Orff approach, students improvise with the altered form of the knowledge. But they can not name what they are doing. They just explore and experiment the knowledge by their own. In the exploration stage of the learning cycle, similarly, students are asked questions and directed by the teacher to help them to make their own meaning out of observations. Here, there is no terminology introduced either.

The third stage called “literacy” in Orff approach where students learn how to read and write. In other words, they can now name what they do and can learn to use the terminology in a correct way. Similar definition can be made for the “term introduction,” stage of the three-stage model of the learning cycle, which gives teacher an active role to name the concepts that have been explored. Both in “term introduction” stage of three-staged model and in “literacy” stage of Orff learning stages, teacher takes an active role in leading the students to develop the concept.

After they experiment, explore, and discover the concept, students are led to apply the knowledge into new invented forms. This stage is called “Improvisation” or “creativity” in Orff approach and it is called the “concept application” in three-stage model of the learning cycle. So, both of these stages are similar in a way that students are expected to use the concept learned in the previous stage into new situations.

The relationship between three-stage model of the learning cycle and Orff learning stages can be seen clearly in the following schema:



As can be understood from the schema, it can be said that there are connections between two different models developed for two different disciplines. Learning cycle is a way of thinking and acting that is consistent with how students learn in science education. Orff approach and its learning stages provide an excellent approach for planning effective music instruction under constructivist approach. As in science education, interactive mode of music teaching and learning indicates that the learner thinks about his or her own experiences, beliefs, and views and personally constructs meaning to acquire knowledge. Both learning cycle and Orff learning stages are instruments that foster understanding the relevance of students’ school learning to their own lives and realization its relationship to personal and societal goals among school children.

5. Conclusion

The formulation of meaningful understanding is critically important for students and that way, instead of memorizing and repeating the concept, students put meaning to what they learn and learning becomes more concrete. Like in many educational areas, constructivism promotes an important goal of music education and science education which contends that learners construct understanding for themselves, based on experiences. The learning cycle and Orff learning stages are only two of the many models that apply in education. It is important to note that the basic principle of these models is very similar for all subject areas. Therefore, teachers should be aware of the main philosophy behind the constructivism and applications of the models before selecting their teaching procedures.

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