

## **Possibilities of inductive reasoning in the dance – making process/dance education**

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### Abstract

In the 21<sup>st</sup> century, there is an abundance of information at our fingertips available through the Internet and other delivery methods. It is imperative that students learn to digest this plethora of information and make sense of it. The thinking strategies of inductive reasoning and inductive teaching (based on inductive reasoning) are ideal for this purpose. The strategies used in inductive teaching include inquiry, analysis, intuition, questioning, researching, investigative reading, critical observation, discerning listening, problem solving, creating projects, and writing based on student decisions. This paper discusses a qualitative research project, where the researcher analyzed what a group of International Baccalaureate high school students thought they learned from their dance-making. The author refines and compares deductive reasoning, or reasoning from the general to specific, to inductive reasoning, or reasoning from the specific to general, and builds the case for using inductive reasoning as a teaching methodology. The paper includes examples of how the students' comments can be connected to inductive reasoning and how these comments span the entire dance-making process. This process includes critically observing the inspiration, using inquiry to research the inspiration, intuitively responding to the inspiration, problem-solving by creating movements, making movement choices based on analysis, using nuanced description to teach movements to others, and later evaluating the finished dance through discussion, questioning, and written description. Quotes from these students' experiences will be used to show how dance-making can be connected to inductive reasoning.

*Keywords:* thinking strategies, inductive, deductive, qualitative research, dance-making process

In the 21<sup>st</sup> century, we are deluged with an abundance of information on a daily basis. In fact, we have so much information at our fingertips that it is impossible to remember it all and make sense of it. For example, we receive information from daily television news shows, radio programming, the telephone, the Internet via e-mail, and from a number of other electronic devices. We are also kept up-to-date about happenings from Twitter, print media, and visual images such as photos, drawings, and diagrams.

As a result, teachers today still teach the content of various disciplines. However, more importantly, they must teach their students how to sift through, organize, connect with, and understand all of the information they receive each day. In other words, 21<sup>st</sup> century teachers are given the responsibility of teaching today's students how to think, analyze, and relate to a wealth of information.

### **Discussion of thinking skills**

According to those who study thinking and reasoning, there are two basic types of thinking skills: deductive and inductive. According to *Webster's Universal College Dictionary* (2001), deduction is a process of reasoning from the general to the particular. In deduction, the conclusions necessarily follow stated premises or hypotheses as in the following example: "All men are mortal. Socrates was a man, therefore, Socrates was mortal" ("Deductive Reasoning," 2011). According to the same *Wikipedia* site, induction is a type of reasoning that makes generalizations from individual instances or observations. The following example from the San Jose State University website (2011) shows how inductive reasoning proceeds from the specific to the general: "I've noticed that every time I kick a ball up, it comes back down, so I guess this time when I kick it up, it will come back down, too." This observation, of course, fits Newton's Law of Gravity. As a result, one could say that deduction and induction are reasoning processes that proceed in opposite directions.

It is also possible to bring some of the ancient Greek philosophers into the discussion of comparing deduction and induction. According to Elizabeth Hayes (2004), Aristotle believed in the reality of objects in our material world and how one could observe these objects through the senses, later organizing one's evidence and formulating conclusions. In contrast, Hayes (2004) stated that Plato believed the real world was a world of ideas created in one's mind. Thus, Aristotle's analysis of human thinking seems to mirror induction more closely, while Plato's summation somewhat resembles the general nature of deductive thought.

### **The role of inductive reasoning/teaching in the 21<sup>st</sup> century**

Returning to our original issue, the author is suggesting here that inductive reasoning is more suited to helping students sort through the vast amounts of information they must deal with. By using inductive reasoning, students can make individual observations based on the plethora of information they encounter, categorize and organize that information, and begin to make sense of it. Knowing how to think inductively can enable students to interpret information in a personal and meaningful way, and apply that information to a multitude of situations. By understanding in this way, students can more easily analyze and apply information they encounter when solving problems and working creatively.

Inductive thinking, when applied to teaching styles, is sometimes called inductive teaching. Inductive teaching can include critical observation, discerning listening, inquiry, analysis, intuition, questioning, researching, investigative reading, writing based on observations, problem solving, and creating projects (Schiffner, 2010). There are many ways students can be taught when using inductive teaching methods. The premise here, however, is that it is possible to integrate inductive teaching together with the teaching of an art form, in this case dance and specifically dance-making.

### **Connecting inductive teaching and students' dance-making**

In a qualitative study, the author and one of her dance colleagues studied what a class of International Baccalaureate (IB) dance students believed they were learning from their dance-making experiences. In the following text, connections are made between the components of inductive teaching as described above, and what the IB students said about making creative work

in their dance class. All of the student names connected with the following quotations have been changed for purposes of confidentiality.

In terms of critical observation, Grant observed, “Everyone’s dance looks so ... different even [when] we’re shooting for the same idea.” Courtney claimed that her work in IB Dance enabled her to be a much more astute observer outside dance class as well. She said, “If I’m sitting in the cafeteria ... it’s very interesting ‘cause they [the people she is watching] all have different postures that portray their personalities a little bit.” Other IB Dance students extended their observation abilities to beings outside of the human domain. Juliana commented, “For our dance concert, we’re doing birds. So we look at the movements of birds .... That’s something that we’ve kind of used as the movements that you take from there” (Minton & Hofmeister, 2007).

The IB Dance students also made comments that could be connected to the discerning listening aspect of inductive teaching. Nicole found, “There’s differences in people .... You need to know how to respect every single one of your peers ‘cause you’re more than likely gonna have to work with them on something [*sic*].” Natalie added, “We’d talk about it and we’d discuss it ... or we’d take their idea ... and [say], ‘That’s a good idea,’ but we could also .... We kind of tip toe around it” (Minton & Hofmeister, 2007).

A part of the IB Dance curriculum is involved with researching distant dance traditions and creating movements based on that research. In addition to using derivations of movements from the distant dance traditions in their choreography, the students described what they learned from the research. Emily claimed “[When] you research how people express themselves ... you have more respect for their culture and the way they see the world,” while Courtney learned, “They use it (dance) as communication between tribes.” Athena added, “When I was researching for my ... paper .... I compared ballet and Bharata Natyam [*sic*]” (Minton & Hofmeister, 2007).

Analysis and intuition are other aspects of the inductive teaching methodology. With respect to analysis, Lindsay admitted, “I thought there’s only the technically correct way to do things, but I’ve learned a lot about changing movements to fit your own style.” Samantha commented that “I’ve noticed ... from watching other people doing their solos that they have their own style ... they’re good in their own way.” From taking IB Dance, Angela realized, “Before I took this class, I just kind of did dance outside of school and the teacher’d make up the choreography for us .... But we didn’t really dissect ... each movement down like we do here.” Many of the student statements touched on or made reference to the use of intuition, as well. Juliana explained, “Learning [dance] style is really kinesthetic because ... it’s ... instilled in your body’s muscle memory.” Once she began doing her own choreography, Natalie realized, “You hear everything in the music and you understand it .... You know you can dance to it. It just clicks a lot better” (Minton & Hofmeister, 2007).

Many of the students’ comments could also be related to the inductive teaching components of questioning and investigative reading. Lindsay noted, “Before IB Dance, I just thought I was a bad dancer, but different styles show me that ... I’m just a different sort of dancer.” Nicole questioned her IB Dance experience in a different way. She said, “We changed a lot of stuff in our dance .... When you compare that to the real world, you need to be able to work with what you have .... With normal classes ... you don’t really get that experience.” In her research,

Athena discovered that “She [the teacher] made us research one style first .... I guess learning the culture beforehand ... helped. Like why do they do these movements?” Through her research, Kaylee was “Introduced to world dance traditions like Indian dancing, Aboriginal, Spanish .... I definitely learned more about culture and how things relate ... to ... the wars .... Everything becomes interconnected” (Minton & Hofmeister, 2007).

The students had a number of comments connected with their writing in the IB Dance class. Juliana found, “Because of dance, I’m able to know what kinds of emotions go along with certain words.” Lindsay, on the other hand, compared her approach to that of writing a paper and choreographing a dance. She indicated, “You have to start in the same way you start a dance. You have a prompt or intent .... there’s also the choreographic form so you have different paragraphs ... but they have to link together or it won’t make any sense” (Minton & Hofmeister, 2007).

Finally we come to the inductive teaching components: problem solving and project creation. Hayley indicated that during choreography and improvisation, “I was forced to open myself and my mind to new possibilities.” In doing this, Kaylee says, “I’ve seen this image and then I’m trying to create it and then all of a sudden it’s .... do this. Try this.” Angela solved her choreographic problems by “figuring out, O.K. so I’m stuck here. Maybe I’ll work backwards.” On the subject of creating, Lindsay said, “Just the idea of having something behind what you do makes you, forces you, to be lot more creative.” Grant discovered that “Taking ... an image or idea and abstracting it and making it ... different .... That really opened up ... creativity. It’s just like a journey to see, to push yourself .... step outside ... what you’d normally do.” Emily explained, “Dancing is ... my way of expressing things that I can’t [otherwise] .... it’s like an outlet” (Minton & Hofmeister, 2007).

### **Summary – Connecting student comments to inductive teaching**

Based on the preceding statements, the IB Dance students clearly learned much in terms of the components of inductive teaching. Related to critical observation, the students noticed differences in the dance ability and styles of others in their class, while becoming more attuned to choreographic details. Improvement of in-class observation abilities also led to an increased awareness of movement traits discovered in students outside dance class and movements found in natural settings.

Because the IB Dance students were required to choreograph a collaborative dance, they became more aware of how to work in group settings. The group work, in turn, encouraged the students to be more sensitive and listen carefully to how others communicate. They also learned to use more subtle language and how to communicate with students who may not have shared similar choreographic ideas.

The culturally-based research that was part of the IB Dance curriculum helped students gain respect for and have an understanding of dances from cultures that differed from their own. The students became aware of how people in other cultures express themselves through dance, and how these modes of expression differed from their own manner of expressing themselves within dance. Recognition of cultural differences naturally led to comparisons between the cultures

studied and the students' own culture. In fact, some of the students were encouraged to do more cultural research based on what they learned about some of the cultural groups and their dances.

Since dance-making is an important part of the IB curriculum, the students frequently analyzed and then discussed choreography created by others. In this respect, the students learned to describe the dance styles of other students and movement details found in their own choreography. Increased sensitivity to movement detail, in turn, enabled many to discover movement variations and possibilities, and how emotions can be expressed through use of specific actions.

Those who have done choreography understand the role intuition plays in the dance-making process, and it was evident that the students in this study were learning to use intuition as a choreographic tool. Some of the students talked about how they could simply feel emotions when watching the choreography of others, indicating that in their own creative work, muscle memory, body knowledge, spontaneous movement or improvisation, and mental imagery were part of their dance-making process. One student even said that in her movement discovery process, some movements just felt right or that they clicked in relation to the accompaniment.

Dance-making in this class often encouraged students to ask themselves questions. In one instance, such questioning involved gaining a new and more positive outlook in relation to the student's own movement abilities. When they were in the questioning mode, some students compared their ability to express themselves through movement to their ability to capture their feelings with the written word, concluding that it was easier to express feelings through movement. Questioning also led to comparing the merits of more academic high school classes to the benefits of the IB Dance class. One student even questioned the entrenched role of technology in our society in comparison to its role in less industrialized societies.

The investigative reading required in IB Dance helped students better appreciate other cultures and the function dance played in those cultures. By reading about the role of dance in other cultures, some students learned to interpret the meaning of specific movements in these cultures as well. Recognizing the vast variety of dance styles and forms was another benefit of reading about other cultural dance forms.

IB Dance students are not only required to read about dance, but also to write about it, too. In this context, some students had difficulty with the written portion of the IB curriculum, while others learned to describe their observations with words and connect words with different emotions. Some students used words to help them analyze movement. One student even compared choreographing a dance to writing a paper because both were initiated with a prompt or intent and followed a particular form or structure.

Last, we come to the inductive teaching components: problem solving and creating projects. In this case, of course, the problems solved and projects created were dances. Some of the students recognized that there are many possibilities when they engaged in the problem of creating a dance. Others learned problem solving skills, such as working backwards, taking a break from creating, or thinking in a spontaneous and random way. During the process of creating a dance, many students recognized the importance of beginning with an intent or idea. They also learned

to tap into their mental imagery, take risks, and step outside of what they would normally create in dance class. In addition, many said that their dance-making was a route to self-expression, and that the creativity they experienced in dance class expanded their creative potential in other areas.

### Conclusion and interpretation

It is obvious that there are many connections between dance-making and inductive teaching as described in this paper. Thus, it is possible that the arts, and in this case dance, could teach students how to think inductively, a skill that would help students sort through and make sense of the vast amount of information they encounter on a daily basis. The students who participated in this study were enrolled in an IB Dance class, a type of dance class that can only be taught at International Baccalaureate high schools. However, it would be possible to integrate aspects of the IB Dance curriculum in other high school dance classes. Such a dance class would stress creative work, research, and writing.

From this study, it is apparent that dance-making is important to and meaningful for students, but when research and writing are added to the mix, students can reap even more benefits. In an earlier study, the researcher found that in the eyes of students interviewed, there are many benefits to the dance-making process, even though student dances may not appear highly polished, sophisticated products to the eyes of an outside observer (Minton, 2007). Overall, when one considers the students' comments, the value of process over product is also revealed.

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