

# Dance Art, Math, Education – an Eternal Triangle

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## Abstract

This paper discusses the nature of art activity, such as dance, in teaching and learning subject matter, such as math, querying what is left from the artistic when art is put to serve a cause, such as education. Does any partner, dance, math or education gain or give up more in the triangular affair?

## Attracting Art into Teaching and Learning

Teaching is about facilitating the learner's interaction with subject matter. Throughout the history of pedagogy, ever since Comenius, efforts have been made to entice and incorporate art into education. The question is whether the artistic survives the utilitarian in this marriage of convenience. This paper embarks on an ontological and epistemological effort to describe the quality and reciprocity of dance and math in an educational setting, borrowing thoughts from educationalists John Dewey and Gert Biesta.

*Dancing Math* [13], a math teaching and learning program, drawing on dance as primary action in subject knowledge shaping, is summarily revisited, including a data analysis from lesson observations, focusing on classroom interaction between teacher, learners and math content. This short paper allows only for a concise review of the program, presented in depth in the Bridges 2016 proceedings. The query in focus here, is what is left of the art mode in a *pas de trois* enacted by dance, math and education – whether any partner gains or sacrifices more in this eternal triangle.

## Art and Dance as Education

Bringing the arts or dance into the realm of education is a delicate matter, implying aesthetic obligations and ethical responsibility. There is, however, a concordance between art and education. Art deals with the everlasting question what it means to be in the world, while the fundamental educational question is how to enter in dialogue with the world – both disciplines deal with human beings' becoming as subjects through interaction with the material and social world [2, 11].

The artist asks questions about human existence and human conditions. The dancer acts as window taking in the world, a *subject-body*, in an aesthetic act of resistance to objectifying, claiming the body's potentiality to explore experiences not yet "one's own" [10], seeing the body as eternally becoming subject, a stance on dance as an act of becoming: the dance of "the not-yet" [11].

Pedagogues instructing children and pupils in dancing have an ethical duty to scrutinize own views of art, and teaching, on remnant paradigms of aesthetic hierarchies and elitist views on talent, objectifying of bodies, and on learning as a linear, predictable, measurable and controllable, cognitive process. As in contemporary dance, learning and life at school can be seen as social choreography with intersubjective embodied interactions without given outcome: school as a stage for life, dance as integrated, multi-meaning shaping action [1], dance as young peoples' actions of becoming in dialogue with the world [15].

This take on education/art/dance is quintessentially relational, communicative and sensuous. The evolving relationships build on children's and pupils' participation, with their experiences, their perception and imagination and the judgement coming out of their relational actions [8]. It requires teaching focusing on content urging for presence, attention and listening, communication, self-acting knowledge and meaning shaping [14].

## **Art and Teaching as Drawing Attention**

Biesta [2] points at the intrinsic similarity between the arts and the act of teaching: to *show something to someone*, suggesting something “out there” is worth *paying attention* to. The artist/teacher initiates the viewer/learner into the realm of sense-making, a world where some things make more sense than other. This initiation, Biesta argues with Kierkegaard, is a “double truth-giving” act: the teacher not only passes on truth to the pupil, but also offers keys to recognize something as true. Biesta refers to Comenius, who in 1658 publishes *Orbis sensualium pictus*, the first textbook with pictures as media of explanation: the picture as archetypical *object* of teaching – which reminds the teacher to refrain from control: offering keys for the search for truth is a gift without counterclaims, lest the pupil be denied to exist as *subject*.

For Biesta, existing as subject is being in dialogue with the world in a grown-up way: not to be in the center, but to sense what the world may expect from one. Teaching, then, is about turning the learner towards the world and awake a longing to be in the world in a mature way, by giving space, by *showing*: Look, there! And invite the learner to pay attention, to step forward as subject or stay behind as object.

## **Aesthetic Literacy and Aesthetic Experience in the Space of Learning**

Gathering around specific lesson content and providing possibilities for communication is crucial in establishing an optimal, interactive *space of learning* of subject matter [12] such as math. The teacher-learner interplay is triggered by the teacher’s awareness and capability to bring out the learners’ previous understanding and conceptions [9]. Learners’ sharing of pre-knowledge, expressed and visualized in talk, gestural expression or other communication modes, is vital to a generative space of learning [8].

Two potential notions for an ontological and epistemological analysis of arts in education generally and dance in math teaching and learning specifically, are *aesthetic literacy* and *aesthetic experience*.

The former relates to the learners’ capability to perceive, interpret and handle aesthetic modalities in their exploration of the surrounding world, a research method to enter unforeseeable spheres of learning with all senses, and through imagination conceive that things can appear differently, to catch sight of something new and unexpected [5].

In Dewey’s pragmatic philosophy of education, knowledge, learning and meaning-making are all shaped by doing, in continuous transactions with the surrounding world [4]. Dewey’s *experience* concept, central in his epistemology, is “aesthetically” redefined in *Art as Experience* [3], though not situated in an educational context. The subject obtains knowledge about the world through the interplay of her or his actions and their consequences, of doing and undergoing, action and submission. Facts are contextually interpreted and understood, depending on the situation and the learner’s lived experience. In *aesthetic experiencing*, words, gestures and other modes of utterances are acts of communication and participation, of sense-giving, and of making common what was isolated and singular.

## **Dancing Math revisited**

The activity prompting the learning process in *Dancing Math* [13] classes is dance. In three-step sections – dancing, wording, formalizing – previous math proficiencies and conceptualizations are visualized on the floor, specific math curriculum content is verbalized, re-conceptualized and finally formalized in formulas, equations and graphics. Dance is the primary mode of communication, constituting the interactive *space of learning* through speechless, bodily interaction, intense presence and upbeat concentration. The teacher prompts for descriptions of the moves, enhancing dance awareness, literacy development including the use of adequate math vocabulary, and mathematical thinking.

Empirical data from over 900 lesson observations between 2014 and 2018 in teacher education programs have been gathered, focusing on specific curriculum content and classroom interaction in *Dancing Math* classes. The lesson observations focused on the learners’ activities and teacher performances and on knowledge goals stated in the Swedish national curricula and mathematics syllabi [16]. The sheets filled out by participating pre-service teachers are moulded on the Swedish school inspectorate lesson observation templates.

Analysis of teaching patterns revealed predominant learner activity in whole class, a high degree of teacher active tutoring, no learner-passive teaching. A large range of curriculum subject content was dealt with. Intellectual, practical, sentient and aesthetical aspects of learning were highlighted, critical thinking and opportunities to develop math proficiencies in physical contexts and by discussing math content revealed in the dancing. The participants' initiatives and explanatory contributions were highly valued, as was the structure of the lesson and the logical flow of dance activities, discussions and math content.

In free comments, the lessons were described as rewarding, fun, urging to grasp complex math concepts, learning with the whole body, developing preservice teachers' proficiencies. New knowledge and re-conceptualizations were stated as likely to stick and last. The approach was seen as an inspiring way of learning, an alternative to using textbooks. Aesthetic activity in learning was claimed to give great input, explaining abstract math issues in a concrete way, all highly pedagogically applicable in school.

In summary, the observations indicate evidence of concentrated, collective engagement in dance as aesthetic expression of subject matter, verbal interpretation and explanation of math concepts. Group dynamics were boosted in corporal interaction and overall intensive class activity, while covering a comprehensive range of curriculum learning goals. Mathematical codes were broken in the dancing and discussing, involving neither textbooks nor ex cathedra teaching [13].

### Discussion

The lesson observations focused on the aesthetic activity of dancing, classroom interaction, and math subject matter dealt with. The analysis results and continued testimonies confirm the math teaching and learning approach “works”. The theme of this paper is to circumscribe the nature of the reciprocity of (dance) art, education and mathematics in this mode of teaching and learning.

One stance is that if art cannot operate as free agent, in education or in any field, it just isn't art. One-sided tendencies towards outcome-orientation, measurability and utilitarianism in education, as well as instrumental takes on the arts, in learning curriculum subjects, or fostering predefined values, do reduce and jeopardize art's free, radical, transgressing force and dialogic potential.

The argument is principally legitimate, art does corrupt itself, whether called to serve education, democracy, or less pleasant polities. Art must be free and independent when asking questions about human conditions. Participants in *Dancing Math* classes do not devote themselves to creative dance for dance's sake, they do not dance as in those educational settings where dance is treated as a singular mode of knowledge and proficiency. Nonetheless, while dancing, the students intensively interact, with each other, with the teacher, with the math curriculum, with their live-worlds, the surrounding world. The activities are anchored in the art of dance, its theories, praxis, artistic and pedagogical research.

In order to understand the nature and effect of dance in this math teaching and learning approach, we may return to the relational and intersubjective view on education and learning deplored above. Taking a roundabout route, we may turn our attention to another triangle, the didactic triangle [7]. As aesthetic and mathematical literacy gainfully interact, dance acts as triggering, dialogical agent in the shaping of relationships between teacher, learners and subject matter. By all means, the learner emerges as subject, capable of knowledge shaping and sense-making, letting their dancing teach, in a self-enacting gesture of *showing*, advocating dance and math literacy simultaneously.

This is where we may discern the transgressing power of aesthetic experiencing. What is borrowed from the art of dance, is its corporal, sensuous quality of communication. The participants make themselves windows wide-open to one another, to the music, the props used, to the math embedded and revealed in the dancing, to the amassed, embodied pre-knowledge. As meaning-seeking subjects, they cooperate, explore, dissect and reassemble the math content offered and made accessible in the dance activities. Submitting to not-yet knowing, they take initiatives, find out by trial and error, spur each other in joyous, engaged learning. The result, as worded in the free comments in the lesson observations, is wonder, empowerment and enlightenment.

## Summary and Conclusions

As teacher, dancer and mathematician, I borrow from the very essence of the art of dance in a particular act of showing: Look, there! Sense! Reflect, pay attention, discern, puzzle out, think together!

So, if the artistic is held back in the liaison with math and education, it does lend the learner its creative power and magic force of revelation and communication for the educational cause. Art's loss is education's gain.

What about math in the affair? Math gives up nothing. Math does not reduce itself in any encounter. Math is epistemically untouchable, eternal as a goddess, lingering on endless secrets. Unfair affair? No. Art and education are part of the human, the social and the cultural – math isn't. Math is, has been, and will always be all around, irreducible, immaterial to being discovered or ignored by humanity.

Nonetheless, artists, educators and mathematicians, academics, theorists and practitioners, do have reason to cultivate intersections, to look at each other's disciplines and points of common, scrutinizing, challenging, changing, redefining their activities, stances and perspectives. Thus, they may all contribute to our eternal struggle to enter and stay in dialogue with the world in a grown-up, inspiring way.

Spaces of aesthetic literacy and aesthetic experiencing, in the arts, in math, in education, imply intense presence, participation and intercourse, an intensified seeing and listening, where imagination opens up for the unforeseeable – spaces open for experience, knowledge and meaning, to enter into, observing, sensing and thinking. Irresistible spaces of becoming [6] – and triangulating.

## References

- [1] E. Anttila. *Dance pedagogy in the contemporary world*. In A. Ståhle (Ed.), *Close encounters: Contemporary dance didactics. Exploration in theory and practice*. Stockholm: University of Dance and Circus. 2013.
- [2] G. Biesta. *Letting Art Teach. Art Education "after" Joseph Beuys*. Amsterdam: ArtEZ Press. 2017.
- [3] J. Dewey. *Art as Experience*. London: Penguin/Perigee Books. 1934.
- [4] J. Dewey. *Democracy and Education. An Introduction to the Philosophy of Education*. New York: Macmillan. 1926.
- [5] M. Greene. *Aesthetics as Research*. New York: The Maxine Greene Center for Aesthetic Education and Social Imagination. 2007.
- [6] M. Greene. "The Spaces of Aesthetic Education." *Journal of Aesthetic Education*, Vol. 20/4. 1986.
- [7] J. F. Herbart. *The Science of Education: Its General Principles Deduced from its Aim and the Aesthetic Revelation of the World*. (H. & E. Felkin, transl.) Boston: D.C. Heath and Co. 1908.
- [8] G. Kress. *Multimodality. A social Semiotic Approach to Contemporary Communication*. Oxon/New York: Routledge. 2010.
- [9] M. Lo, W. Pong, P. Chik (Eds.). *For Each and Everyone. Catering for Individual Differences Through Learning Studies*. Hongkong: Hongkong University Press. 2005.
- [10] B. Manchev. *Vermögen, Ausbeutung und Widerstand der Subjekt-Körper. Für eine trans-versale Veränderung*. In I. Lorey, R. Nigro, G. Raunig, *Inventionen*. Berlin: Diaphanes. 2011.
- [11] E. Manning. *Relationescapes. Movement, Art, Philosophy*. Cambridge: The MIT Press. 2009.
- [12] F. Marton, A. Tsui, P. Chik. *Classroom Discourse and the Space of Learning*. London: Lawrence Erlbaum Associates. 2004.
- [13] P. Moerman. "Dancing Math. Teaching and Learning in the Interplay between Aesthetic and Mathematical Literacy." *Bridges Conference Proceedings*, Jyväskylä, Finland, Aug. 9–13, 2016, pp. 269–276. <http://archive.bridgesmathart.org/2016/bridges2016-269.html>.
- [14] J. Rytzler. *Teaching as Attention Formation. A Relational Approach to Teaching and Attention*. Mälardalen Studies in Educational Sciences. 2017.
- [15] S. Stinson. "Dance education in early childhood." *Design for Arts in Education*, 91(6), 34-41. 1990.
- [16] The Swedish National Agency for Education. *Curriculum for the compulsory school, preschool class and the leisure-time centre*. Stockholm, Skolverket. 2011.