STEM vs. STEAM vs. Arts for Arts Sake:

Although the roots of the division between "right brain" and "left brain" academic subjects began back in the *Sputnik* era (1957), it was not until the STEM (Science, Technology, Engineering, Mathematics) movement of 2001 that this controversy became sharply formalized. The gulf between scientific disciplines and arts, both of which were inextricably linked in ancient times in the quest of finding truth and beauty, grew further as the increased funding provided for teaching STEM disciplines at the federal and state level suggested a predilection for STEM subjects rather than arts.

The test scores of PK–12 students who took the National Assessments of Educational Progress (NAEP) test have driven the rationale for an increased emphasis on STEM education. For the past twenty years this test has indicated that the U.S. is failing to compete with other countries when it comes to student performances in STEM subjects (Finkel, 2012). This, as advocates of STEM education often point out, may have dire consequences on the economic and political power of the U.S. in decades to come. In order to regain U.S. prominence in the near and distant future, the Obama administration's signature education reform, *Race to the Top*, invested $4.35 billion into grants that enabled states that received this grant to put their best efforts into bringing all students to the highest standards of achievement. Many states received "bonus points" for applications that stressed STEM instruction.

While the sense of urgency attached to STEM education may be understandable, the rightfulness of placing so much emphasis on only four isolated disciplines has been questioned by those who recognize benefits that other subjects, particularly the arts, bring to STEM education. The book, *Meeting Standards through Integrated Curriculum* (Burns & Drake, 2004), offers numerous reports on the positive impacts of an integrated curricular approach on test scores of students in STEM disciplines. Additionally, it is suggested that the future economy of the U.S. depends not only on preparing students in STEM disciplines, but it also depends on the U.S.'s ability to be a leader in creativity. White (n.d., cited in Daugherty, 2013) noted that STEM is based on skills that generally use the left hemisphere of the brain where logic resides, while the arts engage the right half of the brain where creativity and innovation are fostered. White expanded on this notion and implied that the combination of STEM and arts education could provide a curriculum that is the most supportive of innovative leadership. Other similar studies have led many to suggest that STEM should be amended to STEAM, where "A" stands for Arts (Wynn and Harris, 2012).

Music, as one of the eight arts, is only anecdotally mentioned in STEM vs. STEAM studies. For example, Nobel Laureates in the sciences tend to be 25 times more likely than the average scientist to sing, dance or act, 17 times as likely to be artists, 12 times more likely to write poetry or literature, and four times more likely to be musicians (Root-Bernstein & Root-Bernstein, 2013). Gershon and Ben-Horin (2014) discussed the power and possibilities that the process of music-making holds for inquiry-based science education. While a number of studies provide evidence for positive impacts of arts on student achievement in STEM disciplines, there is still no inquiry on how STEAM benefits *arts* education. Common sense informs us that such inclusion could provide more funding and support for the arts. However, the question, "shall arts be valued and supported in our schools for their intrinsic values and for what arts bring to human lives: a sense of meaningfulness, joy of aesthetic expression, and the development of a unique type of intelligence" remains open for dutiful consideration. The proposition that arts are fundamental to human beings for their own sake aims to re-invigorate thinking about the value of the arts in education that are not based on any utilitarian objective, but rather on understanding that arts are fundamental to humanity and its prosperity.

Educational Psychology and Music Education Philosophies in Service of Music Education

Since the 1950s, American music educators have embraced several tenets found in Educational Psychology to facilitate the teaching and learning of music, most notably: Behaviorism (Skinner), Cognitivism (Bruner), Humanism (Maslow), and recently a Socio/Biological model (Rauscher). Additionally, since the 1970s at least three philosophical views have influenced music education in the U.S.: "Aesthetic" philosophy (Reimer), "Praxial" philosophy (Elliot), and the "Inclusive" philosophical view (Jorgensen). Those theories contributed to shaping the music education system in the U.S. into one of the most viable systems in the world. For the purpose of this article, however, only theories and philosophies that contributed to strengthening views on arts and music as their own entities that are equally valued and important to any other academic subjects will be briefly reviewed.

Jean Pestalozzi and "whole person" education

Jean Pestalozzi (1746–1827) was a Swiss pedagogue and educational reformer whose theoretical and practical work not only overcame illiteracy in 18th-century Switzerland but also made a lasting impact on education around the world in the centuries to come. In his book *The Education of Man: Aphorisms*, Pestalozzi (2007) explained his idea—revolutionary for its time—of educating the whole person. He also coined the well-known "Three H" motto: "learning by head, hand, and heart."

This motto found its direct application in Boston public schools when a special committee, appointed by the Boston school board, proposed that music was a benefit for students intellectually, morally, and physically. Continuing well into the 20th century, Pestalozzi's "Three H"

motto was transformed into three taxonomies of educational domains: the cognitive (head), the psychomotor (hand) and the affective (heart). These still today guide educators in the development of learning objectives that aim to address the holistic student.

In addition to his seemingly timeless idea of education which molds the "whole" person, Pestalozzi was introduced to American music instruction through eight principles of learning that applied to teaching music: teach sound before symbol; observe by hearing and imitation (rote); teach one thing at a time; master each step before going on (sequential learning); practice before theory; teach from the elements of articulated sound (that is, musical elements); use child-centered approaches with little assistance from the teacher (teacher as facilitator); let the child find out answers and correct answers (discovery learning). A century and some years later, Pestalozzi's idea of "whole person" education found its reflection in the humanistic theories of Abraham Maslow who viewed arts as the vehicle to realizing humanity's highest potentials.

Abraham Maslow and "humanistic theory"

American psychologist Abraham Maslow (1908–1970) is best known for his *humanistic* interpretation of motivation. Unlike many psychologists of his time who based their theories on analysis of problematic lives, Maslow focused on positive qualities of people. His studies of successful people, including Albert Einstein, led him to believe that all humans have a need for self-fulfillment, which he termed "self-actualization."

In order to reach this highest level of existence, in his book *Towards a Psychology of Being*, Maslow (2014) suggested, people are intricately motivated to advance their position on a *hierarchy* of needs. He called the four lower-level needs—for survival and safety followed by belonging and self-esteem—*deficiency* needs. When these needs are satisfied, the motivation to fulfill them decreases. On the other hand, he labeled higher-level needs—intellectual achievement, aesthetic appreciation, and finally, self-actualization—*being* needs. When these needs are met, motivation does not cease; indeed, it increases to seek further fulfillment.

Maslow viewed the study of arts as a vehicle to "self-actualization," as arts activities challenge the highest intellectual potentials. He suggested that through the pleasure that accompanies music studies, students can experience a full emotional life. Many tenets of aesthetic education are based on these humanistic principles and are often echoed in the writings of Bennett Reimer.

Bennett Reimer and "aesthetic music education"

Bennett Reimer (1932–2013) was an American music education philosopher and scholar whose seminal work titled *A Philosophy of Music Education* (2002) marked the beginning of an aesthetic view on music education. Before Reimer, justification for music education was based on descriptors such as "building character," "instilling confidence," "team effort," and a variety of similar non music-oriented reasons, all of which do not provide coherent frameworks for music education, nor do they provide music a unique place in curriculum.

Reimer proposed that music is the "basic mode of cognition" and that it is distinguished from other modes of cognition by its non-discursive qualities. He believed that music should be taught because it develops the form of self-knowledge or intelligence that is "unavailable in any other way" (p. 28). He proposed that it develops aesthetic sensitivity through deepening and refining the mental sensation of feelings. According to Reimer, development of this mode of intelligence, "is essential if education is to help children become what their human condition enables them to become" (p. 85).

General music classes, with their focus upon perceptive listening to a wide range of musical works, are where music education should place most of its emphasis. Performance, per sé, according to Reimer, is not a desirable way to educate students in music, as such orientation lessens development of aesthetic sensitivity.

David Elliot and "praxial music education"

Another American music education philosopher, Reimer's student, David Elliot, on the other hand, believed that music should be learned through music making and that music making should precede music listening. He agreed with Reimer that music is a cognitive human activity but it is also "something that people do" (p. 39) and in his book *Music Matters* (2014) he combined the two components under the umbrella of *praxial* music education. Doing music, according to Elliot, has two interdependent manifestations: music listening and music making, both of which revolve around a form of procedural knowledge called "musicianship." Such knowledge does not separate action and thought; indeed, the actions of making and listening to music involve thinking, or cognition, which is manifested in and within those actions, not prior to or apart from those actions. Simply stated, according to Elliot, music making is music action.

Performance and authentic music making such as improvisation, composing, arranging and conducting, informed and demonstrated through musicianship, should be the primary means of teaching music as they involve multidimensional data and provide a form of intelligence that is unavailable in any other way, even through other arts. For that reason, Elliot says, "music making is valuable and significant in itself because it propels the self to higher levels of complexity" (p. 122).

Conclusion

If the past informs the future, music education in the U.S. will continue to be influenced by ever-changing educational policies, theories and

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STEM vs. STEAM continued...

movements; STEM vs. STEAM being one of them. While giving arts and music an independent and equal position within PK-12 curriculum may at this point be beyond the control of the music education community, music educators do have the means to deepen their understanding of the critical position of arts and music education in the school curricula. Reading and revisiting some of the most important theories and seminal books that shaped music education in the U.S. during the past 150 years can help remind us why the U.S. is one of the strongest and most vital music education systems in the world. That way, when the time comes for yet another educational policy review, music educators may be better prepared for informed action that will keep providing music education with its rightful place among other core subjects in American schools for the greatest benefit to all students and our nation.

References

Burns, R. C., & Drake, S. M. (2004). *Meeting standards through integrated curriculum*. Alexandria, VA: American Society of Curriculum Development.

Daugherty, M. K. (2013). The prospect of an "A" in STEM education. *Journal of STEM Education*, 14(2), 10–14.

Elliott, D. J., & Silverman, M. (2014). *Music matters: A philosophy of music education*. (2nd edition). New York: Oxford University Press.

Finkel, E. (2012). What can U. S. schools learn from foreign counterparts? *District Administration*. Retrieved February 15, 2015, from http://www.districtadministration.com/article/what-can-us-schools-learn-foreign-counterparts

Gershon, W. S., & Ben-Horin, O. (2014). Deepening inquiry: What process of music making can teach us about creativity and ontology for inquiry based science education. *International Journal of Education & Arts*. Retrieved February 14, 2015, from http://files.eric.ed.gov/fulltext/EJ1045934.pdf

Maslow, A. H. (2014). *Towards psychology of being*. Floyd, VA: Sublime Books.

Pestalozzi, J. H. (2007). *The education of man: Aphorisms*. (2nd edition) New York: Philosophical Library.

Reimer, B. (2002). *A philosophy of music education: Advancing a vision*. (3rd edition). Upper Saddle River, NJ: Pearson.

Root-Bernstein, R. S. & Root-Bernstein, M. M. (2013). The art and craft of science. *Educational Leadership*, 70(5), 16–21.

Wynne, T. & Harris, J. (2012). Toward a STEM + arts curriculum: Creating the teacher team. *Art Education*, 65(5), 42–47.