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Science Education For All: Dreaming the Impossible Dream

My Vexation

Secondary teachers specialize in particular academic disciplines – they are charged to represent the importance or relevance of their discipline to our everyday understanding and perception of the world. For example, English teachers strive to relate to students the importance of grammar and literary form in written and spoken language because of the emphasis on communication in our society. In that vein science teachers, within their particular disciplines, should place an emphasis on providing students with an understanding of scientific concepts that explain the world and the variety of natural phenomena in it. I would hope that an English teacher deeply desires for each and every one of his/her students to be a reader/writer; in that same way, every science teacher should deeply desire for each and everyone of his/her students to be a scientist. I contend that this desire should fuel the goal of providing all students with a kind of science education that would not only support academic and career aspirations in science and related fields, but one that would develop science “literate” – individuals who are confident in their ability to use the “ways” of knowing and doing science for personal, community, and global decision-making.

How many times have I asked myself “Science (literacy) for all - is it really possible?” How many times have you asked yourself the same or similar question? Why does this nagging question persist with me? I offer a couple of reasons:

Reason 1: We have tracked and still continue to “track” students towards and away from science based on demonstrated ability and achievement, rather than on potential, interest, and aspiration.

Reason 2: Limited and uninformed views of science potentially circumvent any science curriculum and instruction (traditional or innovative) that challenge stereotypical ideas about knowing and doing science.

The result: young children who lose motivation and interest in science at ages well before adolescence (e.g. before entry to middle school); teachers and programs that serves as “gatekeepers” to a world of science learning and achievement; a set of societal and institutional norms that effectively maintains the status quo; and finally a “science for all” rhetoric that lacks conviction and commitment to “leveling the playing field” for students who do not overtly exhibit stereotypic characteristics of high-achieving science learners (e.g. placement in gifted and talented programs, enrollment in accelerated courses, participation in related enrichment programs).

Over the years, I have developed what I characterize as a “bifocal” view of science education, based on my personal and professional experiences with science/science education. On the one hand, my personal experiences has taught me a valuable lesson about advocacy - being advocated for as an African American female in the sciences, as well the importance of advocating for others. I have found myself on at least two occasions assisting other graduate students in the sciences with making the decision and then the transition from science to science education. I’ve found that I’ve become less and less concerned about students “making it” in the sciences – an ideology really more appropriate for a discussion on postsecondary science education – and more concerned about what we are making of our opportunities in K-12 science education. With my professional “lens”, what I see is an *absence* of what was critical to my success in science/science education – advocacy. But it’s not the absence of advocacy in general that is troubling. It is the absence of advocacy based on a lack of belief in what Vanessa Siddle Walker calls the “highest potential” of all children. Because, quite frankly, it is extremely difficult to advocate for something or someone you do not believe in.

Recently, NSTA updated its position statement on professional development (NSTA, 2006). The authors state: “to best serve all students as they learn science, professional development should engage science educators in transformative learning experiences that confront deeply held beliefs, knowledge, and habits of practice” (pg. 2). Science educators who focus on issues of equity and diversity recognize that some of the “deeply held beliefs, knowledge, and habits or practice” science teachers express about “science for all” have proven to be quite intractable. However, we should be not too surprised by this – these “beliefs”, “knowledge”, and “practices” are firmly supported by societal and institutional norms. Even when such norms are recognized and critiqued, a change in beliefs, knowledge, and practice that counter said norms does not always follow. The

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socialization processes have proven so effective that teachers with the best of intentions cannot withstand the systemic pressures within their profession.

It turns out that resistance to the “status quo” is rarely easy and without some risks. So why do we expect science teachers to engage in such risk-taking, when the professional communities in science and science education have yet to do so? Moreover, what can these communities offer to those science teachers who dare to take such risks? I think that first we have to believe that these teachers, individually and collectively, are critical to and capable of addressing the challenge at hand. And if we believe in them, in what ways have we advocated for them, so that they in turn will advocate for those children who would otherwise not stand a chance in this game we call science education?

My Venture

I’m suggesting that “science for all” should be more than a dream, more than a hazy vision of something not quite attainable. The manifestation of “science for all” should encompass the realities of engagement, participation, access, and success as a result of science learning. Without this broader perspective of science literacy, we will continue to miss the target. For example, a limited focus on science achievement, rather than engagement, has not helped us make great strides in “science for all”. In teacher education, we are still struggling with the challenge posed by Jennifer Obidah and her colleague - “cultivat[ing] a pedagogy of achievement for low-income and minority students” and then convincing our teachers of such a possibility. So maybe our efforts should focus on more than just achievement.

Believing that science teachers can make an impact means that we have to first let them know that we are willing to take similar risks in the work of achieving “science for all”. Science educators can take a risk by helping science teachers see curriculum standards as a starting point, rather than the gold standard, for excellence. Scientists and science educators can place more emphasis on the role of creativity, intuition, and risk-taking in knowledge creation and advancement in science. Enough with the stereotypic profiles of the high-achieving, straight-A, self-proclaimed “nerds” engaging in university level scientific research. We need more stories about out-of-classroom science learning and adventures featuring Lisa Delpit’s “other people’s children” - who, incidentally, also possess the capability to inquire about and investigate questions of meaning and interest to them. Doing these things and more is important for students, but I conjecture may be even more important for the science teachers who these students will look to for guidance on an unfamiliar path.

I think what we are in search of are more of Gloria Ladson-Billing’s “dreamkeepers” – those teachers who unfailingly believe in the greatness of their students. Do such teachers exist or have we yet to succeed in preparing them? My hunch is they do exist and we have underestimated their worth and impact on the lives of kids who may have never engaged with science had it not been for that teacher. What have we, scientists and science educators, done to acknowledge such accomplishments that we ourselves have trouble believing are even possible?

The work I do with beginning secondary science teachers is intended to put them on the path of teaching for equity and excellence. One way I’ve decided to approach this is to require them to learn more about the life of Albert Einstein and explore society’s perception of him as a “genius”. We’ll take on the questions “What does ‘genius’ mean anyway, and did Einstein consider himself a ‘genius’ in the way that he’s stereotypically portrayed?” I’m anticipating what we learn about Einstein will challenge our current conceptions of ability, giftedness, talent, and potential, particularly as it relates to science learning. But my venture doesn’t end there. I’ve decided to stop wondering about their existence and seek out those “dreamkeepers” – those experienced science teachers who have long sense figured out what we are still struggling to say and do. I think they may hold the key to unraveling the “big secret” of science teaching for all. Do you know a “dreamkeeper”? Send them my way.