

Presidential Speech – 2011
Dana L. Zeidler

NARST A worldwide organization committed to the improvement of science teaching and learning through research.

Global Sustainability and Public Understanding of Science: The Role of Science Education Research in the International Community

One of the many tasks the President of NARST is charged with is selecting the theme for our annual conference. In doing so, one attempts to cast light on a topic or problem related to our field by blending their perception of what is critically important with what may be, or ought to be, of interest to the membership at-large. Quite often, this address is used as a bully pulpit to reinforce the salient points of the conference. This rather seems like heady business, until I remind myself of what several past presidents of NARST have noted – which is that the membership is unlikely to remember much of what you have to say other than for a few fleeting moments beyond dessert. Indeed, this fact gives me pause to think about the validity of that observation – and so I was compelled to think back to what thoughts were likely running through my head when I was listening to past addresses. Typically, those thoughts entailed scoping out whom may have not eaten their dessert so I could better position myself for seconds at the table, and whether the talk would end before the next session began. To this let me just say, I will endeavor to end my talk with sufficient time for you to cakewalk to the next session, following the maxim that less is more; but you're entirely on your own in scoping out seconds for dessert!

OK, now a pop quiz. Show of hands. How many in this room can recite the theme of this year's conference? (I thought so!) It is: ***Global Sustainability and Public Understanding of Science: The Role of Science Education Research in the International Community***. I fully understand that for many of you, the conference theme may represent little more than a historic anachronism; it's something that we have always done, and serves as a rally cry to circle the wagons around the papers submitted for that conference and hopefully, at the very least, provides common ground for the keynote addresses. And I want to emphasize to you that during my tenure in the presidential role, I have seen the NARST board most emphatically embrace a truly international worldview for the identity of NARST.

I suspect that the issue of sustainability coupled with public understanding of science is one that virtually all science educators would promote. We have a

diverse field – note the array of topics represented by authors within our multiple strands. But it seems to me that we do share common goals: scientific literacy for all, teachers who challenge their students’ epistemological beliefs, and providing opportunities for students to become responsible citizens that give deliberate thought to the quality of the world in which they dwell.

But what does it mean to think in scientifically responsible ways? What does it mean to think globally and act locally if words and deeds are to be viewed in a global context? That we live in a pluralistic world with competing values is brute fact to be reckoned with. Defining what it means to think responsibly in a pluralistic community is both an academically interesting challenge and a task that is necessary to support the quality of our physical, organic and social world. Here, I wish to argue that if we hope to achieve a common vision of sustainability and facilitate public understanding of science, then we will find that thinking in scientifically responsible ways requires features of character, which in turn requires the formation of conscience. For this to happen, there needs to exist a sense of *community* in science education.

All of us recognize the need for future scientists to be insightful and well grounded in their respective research programs. But I am also concerned about the larger majority of students who will not seek scientific professions, but who, nonetheless need to be functionally scientifically literate and make informed judgments about decisions that impact the biological, physical and social environment.

If the crux of making informed judgments about worldly matters depends on being scientifically literate, and the expression of scientific literacy is defined in terms of responsible decision-making, then we find ourselves in the mist of tautology. To clear the mist, let us consider the following conceptual distinction. We need to ask ourselves if we can imagine a world where one can be properly identified as being scientifically literate, yet bear no responsibility to subsequent decisions made about policy, research, community, family and the like. We would likely agree that such an individual would possess technical competence, but lack the *inclination* to enact that knowledge with due consideration of the world around them. In the alternative, can we imagine a scenario in which one makes consistently responsible decisions that impact the world around us and lacks scientific literacy? We would be hard pressed to imagine such decisions not being *informed* by knowledge of or about science. It would seem that some manner of scientific literacy is a prerequisite to making responsible decisions, though not a sufficient condition for such decisions to occur. While literacy may not require a moral compass, scientific literacy, in the sense that I am prescribing, does.

The important tenet that bundles these ideas is that the *Scientific Community*, which mirrors the ‘free market’ state of Community proper (Gemeinschaft), is in its ideal form, open and inclusive to the free exchange of arguments and ideas. What unifies us, therefore, is the presupposition of personal utility and social value placed on evidence and the construction of knowledge. Such a *worldview* subsumes both the canons and orthodoxy of western science (i.e., positivism, scientism, etc.) as well as that which western science describes as *ethnoscience* (i.e., native science, indigenous ways of knowing, etc.)

I am keenly aware that some may see such an inclusive view of “scientific” knowledge systems as conflating. But I am suggesting that when the derivation of knowledge through persistent observation and exploration is coupled with clear reasoning, and the subsequent decisions that follow are based on known *evidence*, when one can provide justification and be open to criticism, revision or refinement, thereby reconceptualizing that knowledge, then an open, unfettered state of (scientific) community may be said to exist.

My argument is also one that views the bifurcation of science into non-normative components (e.g., data gathering, observation, predictions, scientific methods and processes) and normative components (e.g., prescribing courses of action, choosing to create selected products, decisions about what ought to be done) as one that is fraught with peril. While such a distinction is, arguably, conceptually important, it can create a splintered view that allows for the abdication of any sense of *responsibility* during the practice of science.

In this conception of science, prudence is expressed by virtue of the fundamental function found in the deliberate choice of what works and makes sense with respect to the quality of life for each individual, as well as how it contributes in morally just ways to community survival. As decisions are evaluated in terms of their future ecological consequences, and in terms of how the amelioration of historical wrongs may be leveraged, conscience may now be allowed to emerge. This describes a world, perhaps a best-case scenario, where the practice of science becomes *inseparable* from acts of responsibility. In such a world, we recognize prudence as the cultivation of scientific responsibility through the expression of social justice in the scientific community. While many scientific communities are loosely articulated around the world, I believe that we must view science and science education as a global endeavor,

unified by conscientious scientific thinking and acting through the formation of character. In this world, the processes of science become causally linked with the products of science. And because so much of what we do scientifically has potentially global consequences, responsibility becomes even more ethically obligatory.

By encouraging responsible scientific thinking, I aim to foster conscientious scientific practices for all students. Within the scientific community, “conscientious” may be viewed as the attitudes and actions that demonstrate great care and attention to conducting any task. However, this requires not only technical competence, but *moral aptitude* as well. There must be present a sense of *rigor* that stands in contrast to what many engaged in “professional ethics” would think of as merely a “sense of right and wrong.” In contrast, I would like to suggest that science education, in the pursuit of rigor, focus on formation of what Green (1999) terms the *conscience of craft*. The metaphors typically used here include phrases like “hitting the mark” and “perfect practice” reflecting traditions of the classic Greeks who equated morality with skill and craft. It is in this sense that I would wish to advance rigor as the ability to skillfully craft judgments and initiate actions out of a cacophony of partial and often conflicting evidence. These are tools of virtue – crafted in such a way as to live skillfully and prudentially. To this, I wish to emphasize that membership in the scientific community – being part of a pluralistic world, carries with it moral obligations to the welfare of that community as well as other communities at-large. (It is interesting to note that the Greek word for “individual” was *idiotes* for someone who was disengaged from the polis and all aspects of public and community life. Of course, contemporary etymological derivation gives us the word “idiot.”)

So, to avoid a sea of nattering nabobs of negativism and idiots (apologies to William Safire), a reasonable approach may be found in fostering responsible scientific thinking through agency. Sociocultural perspectives in science education have compelled those who recognize the power and potential benefits it holds for our students to mesh scientific literacy with a sense of personal identity. Equally important is the development of shared commitment to agency at the group and community level. To help realize this, pedagogy needs to be *transformative* in both formal classroom contexts as well as informal social settings.

Both identity and agency entail the ability to engage in reflective thought and apply one’s awareness of epistemic schemes to new contexts. It seems reasonable

then, to use the construct of agency to foster responsible scientific thinking, and ultimately the development of character. Doing so is *transformative* in that it allows freedom of thought and the liberating power to engage in and be part of a wider network of niches in the social and natural environment.

As we strive to promote functional scientific literacy characterized by reflective judgment, the formation of conscience and the development of responsible scientific thinking that they together comprise, we find that the formation of character becomes a necessary component to foster responsible agency in the global science education community. This, to my way of thinking, is a fundamental precondition for any notion of global sustainability.

There is more work to be done. More questions to consider. More research to undertake to flesh out and explore these areas. These are, indeed, exciting times in science education! How fortunate we are to share this temporal cross section with one another! Let us continue moving forward to become one global community -- NARST *A worldwide organization committed to the improvement of science teaching and learning through research.*

Good luck to all of you in your research and practice! Thank you for the opportunity to serve as your president. It has been my privilege. Enjoy the rest of the conference!