One of my favorite quotes is from Carl Sagan. In his book, *Demon Haunted World*, he said, “We have arranged a civilization in which most crucial elements profoundly depend on science and technology. We have also arranged things so that almost no one understands science and technology. This is a prescription for disaster. We can get away with it for a while, but sooner or later this combustible mixture of ignorance and power is going to blow up in our faces.” This speaks to the notion of a ‘technocracy’ taking over the society in which we live. Just as aristocracies (in the traditional sense) have proven ineffective and dangerous to a freethinking society, a society where the power rests in the hands of the elite and technically knowledgeable is a frightening and dangerous thought. If science education continues in present form we have no reason to believe this trend, which Sagan saw growing throughout our society, will slow its pace.

The logical tonic for this malady of ignorance is a healthy, prescriptive dose of scientific literacy. Yet this cure raises many more questions, not the least of which is: what are the important aspects of a scientifically literate person that set them apart from others? As I see it, with the help of the many authors we have read thus far, there are three such aspects: conceptual understanding, discursive application, and an epistemological underpinning. If one is literate in science it does not mean, to be sure, that they are capable of complete understanding within the entire realm. The subject is too vast, and the methods too numerous. The object of being scientifically literate in today’s society is as much a comfort with the ideologies and epistemologies of science as it is a level of competence in the subject. Scientifically literate people are able to observe the world around them using logic and reasoning skills to ask intelligent and useful questions about their environment, come up with plausible explanations and applications of phenomena based on empirical evidence, and communicate their findings with others in a rhetorically effective manner. They are capable of recognizing patterns, investigating them, using them, and eventually understanding them deeply; but they must be able to test these answers and patterns in the socially constructed manner valued by the scientific community. In order to accomplish these things a working vocabulary is necessary – the concepts and knowledge (quite a language unto itself) that have become rather canonical in science.

In order to demonstrate scientific literacy there must be some interaction with the natural world. Though Bazerman (1988) identifies some basic constraints on truth mediated by the physical world, there are also many mediated by culture, language and socio-economic status. To say that science is open to all participants is to ignore the social aspect of the field – communities of scientists have highly evolved language and rhetoric that is not easily accessible to those growing up outside its purview (Haladay & Martin, 1994). As the result of its evolution into a highly nominalized – thus, impersonal, where actor and action are removed from the story – language, the hierarchical nature of scientific concepts become even more difficult to learn for students. Because of the inherent difficulties in language and rhetoric, minority students especially tend toward not identifying with this domain of schooling – widening the achievement gap – which researchers like Gilbert & Yerrick, Hilton-Brown, and Warren, et. al have shown. Furthermore, Hall raises the issue of devaluing minority language, culture and discourse which has clear ramifications for the hegemonic discipline of science. Sometimes the difficulties are cultural discontinuities – cultural incompatibility with accepted scientific logics, or the result of a socio-cultural dilemma (Ogbu, 1982). Either way, current reform movements in science education do not take this cultural element (both related to discursive application and general epistemology) into enough of an account (Ogbu, 1992) – this is certainly missing from documents like the National Science Education Standards.

Science, and with it our understanding of the world around us, has grown in scope due to the development of an incredibly effective system of social dialogue in conjunction with the collaborative efforts of countless individuals communicating their ideas and findings to the world for all (at least those within the community) to question, reflect upon, test and accept, or deny. Without a truly literate populace – and not just a relatively shrinking “majority” segment – this questioning halts. This qualifies as the explosive result (perhaps, literally) of which Sagan warns.