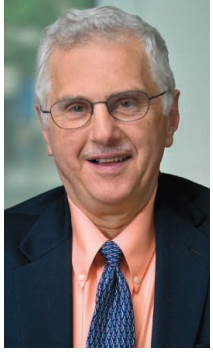

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Prioritizing Science Education

IN THIS SPECIAL ISSUE ON EDUCATION, *SCIENCE* FOCUSES ON THE CONNECTION BETWEEN LEARNING science in school and the acquisition of language and communication skills, emphasizing the benefits of teaching science and literacy in the same classrooms whenever possible. In the United States, this would be viewed as a radical proposal. Unfortunately, the great majority of Americans are accustomed to science classrooms where students memorize facts about the natural world and, if they are lucky, perform an experiment or two; in language arts classes, students generally read fictional literature and write about it in fossilized formats such as "compare and contrast."

The exciting news, affirmed in many articles in this issue, is that "science learning entails and benefits from embedded literacy activities [and]…literacy learning entails and benefits from being embedded within science inquiry."* Here, it is helpful to distinguish between factual (or informational) and fictional (or narrative) text. Science reading and writing is largely of the former type, and it is this factual, informational text that dominates today's knowledge-everywhere world. Yet, most of the formal teaching in language arts classrooms deals with fictional text. My own failed efforts at storytelling lacked the imagination to do anything more than rewrite Hansel and Gretel in a thinly disguised new context. Without doubt, learning to write and read clear and concise informational text, as in summaries of investigations in science class, is an essential preparation for nearly all of life out of school.

By reconceptualizing science education through closely connecting literacy lessons with active inquiry learning in science class, one can make a strong argument for greatly expanding the time spent on science in primary school, to at least 4 hours a week. This alone would carry tremendous benefit in places where, like the United States, science for young students has often become marginalized to less than an hour a week.

A second advantage to forging this connection between literacy and science teaching is that a well-taught science class gives everyone a chance to excel in something. It is hard to stay motivated and interested in schooling if one is always in the bottom half of the class. By linking literacy and science education, those who are more challenged with making progress in reading can gain the self-confidence needed to succeed by demonstrating skills in analyzing a problem that stumps the better readers. Or they might excel in the mechanical manipulation of objects required in a science lesson. From this perspective, the penalties for "failing" schools in my home state of California are tragically wrong: Students who struggle with reading or math are given double periods of reading or math drill, and the very set of activities that could excite them about school is eliminated.

I am reminded of the schooling of P. Roy Vagelos, an outstanding scientific leader in U.S. academia and industry. A fellow biochemist and a friend, Roy topped off his career by becoming the chief executive officer of the major pharmaceutical company Merck, with *Fortune* magazine anointing his company as the "most admired in America" for seven successive years (1987 to 1993). In his biography, he describes himself as a poor memorizer, who nearly failed first and second grade and was largely alienated from school until he was given the chance to demonstrate other skills that allowed him to excel.†

How many talented young people are we losing in today's schools, driven by test scores that reward teachers for drilling students to remember obscure science words, and by an early reading curriculum based on stories and folk tales? Instead, we should be rewarding them for teaching science inquiry skills and literacy together, through collaborative and critical discourse.‡

–Bruce Alberts

10.1126/science.1190788

*P. D. Pearson, E. Moje, C. Greenleaf, *Science* **328**, 459 (2010). †P. R. Vagelos, L. Galambos, *Medicine, Science, and Merck* (Cambridge Univ. Press, Cambridge, 2004). ‡J. Osborne, *Science* **328**, 463 (2010).

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