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State Board of Education
 333 Market Street, 1st Floor
 Harrisburg, PA 17126
 June 30, 2021

Sent via email: ra-stateboardofed@pa.gov

To the Pennsylvania Board of Education,

As a Pennsylvania citizen, the parent of three students who graduated from Pennsylvania public schools, and most important an educator at the post-graduate level, I write today to encourage the Board to postpone adoption of the proposed secondary education standards for science education, and to use that time to consider carefully the thoughtful comments of many of the Commonwealth's leading science educators. I have read through their concerns and suggestions and agree wholeheartedly with the points they have made.

I commend the Board for its stated commitment to a strong, comprehensive science curriculum and I applaud the seriousness with which you have undertaken the task of crafting robust standards. However, I must agree with the experienced science educators who suggest that crucial concepts are left out of the proposed standards—concepts that are essential to educating our students, who will hold the future of this Commonwealth and its citizens in their hands, for the complex, challenging world they will face.

Others have detailed the specific concepts and content areas that should be included more eloquently and with more scientific depth and authority than I bring to the table (see, for example June 30, 2021 letter from Riverbend Environmental Education Center signed by science educators, public school directors and state representatives). I have read through that document and have discussed its content, and find their position irrefutable. Though I am not a scientist, I am a life-long educator; what I can speak to with authority is the case they make for why including these concepts, and structuring science education in the way they suggest, is crucial.

First: Environmental education, structured comprehensively (as suggested in the June 30 letter) is fundamentally interdisciplinary and this is the best way to teach. Thirty years of teaching has convinced me that interdisciplinary, integrated education provides the most effective way to teach—to teach *anything*. I have seen it in my own students. Law students must be able to see how substantive areas (tort, criminal law, procedural law) fit together if they are to become lawyers. Further, they must see past the elements of a tort to understand how the legal concepts and policies shape society and have tertiary effects beyond the confines of a case. Only when we take the time to make these connections do they have the hope of actually becoming competent lawyers.

I have also seen the impact of interdisciplinary education on my own children and how they have learned. They had the benefit of an extraordinary environmental-literacy focused interdisciplinary curriculum in middle school, and it simply changed how they learned and how they approached education going forward. All three graduated from Radnor public schools and have gone on to successful lives (one, an honors student in Evolutionary Biology, undertaking her own field research for the past four years, the second, the Director of Curriculum K-12 for an underserved school in Kansas City and the third a partner in a leading Delaware law firm). The impact of seeing connections, and understanding how science, math, social studies and language arts come together literally changed how they learned—and made them more independent, self-motivated students equipped to solve problems and take on the challenges of citizenship.

A well-constructed environmental literacy curriculum provides both the scaffolding and the content for this by necessarily requiring students to explore and understand crucial connections, and so helps them become better life-long learners, and individuals prepared to take up their role in society.

Second: Our future depends on a citizenry that is prepared to navigate effectively the challenging environmental issues we will face. A strong, comprehensive environmental literacy curriculum in the public schools will prepare students. All Pennsylvanians, but especially this Board, hold our children's future, and frankly the Commonwealth's future as trustees; our duty is to ensure our students are prepared to face down the serious problems (those we can anticipate and those we cannot) they will encounter. Environmental issues drive most of the vexing problems we confront, from health, to the economy, to our food sources, to the air we breathe the water we drink, and even where we will be able to live. To effectively handle these issues will require a strong foundation in complex environmental concepts and the skills to analyze, problem solve and communicate solutions. Essential to this are the comprehensive content areas outlined in the June 30 letter. It is not enough to simply skim the surface. The curriculum must include complex content and connections.

I believe in public education. I am the product of public elementary, secondary and college level schools. I owe what I have achieved to the fine education I was offered by public schools. Because of this, and because as I lawyer, I understand that an excellent, sophisticated, well-funded system of public education lies at the very heart of a vibrant, functioning democracy, I remain personally and professionally committed to ensuring that our public schools are all they should be and all they can be. That is why I have taken the time to write today. The decisions you will make about the structure, content and nature of the science curriculum standards for Pennsylvania's public schools matters. I urge the Board to extend the time to consider the proposed science standards and engage with the science educators who have expressed concerns with the current proposals and have offered reasonable, responsible suggestions.

Thank you for your time and consideration.

Sincerely,



Doris DelTosto Brogan
Professor of Law, Harold Reuschlein Leadership Chair¹

¹ The opinions expressed in this letter are my own and do not necessarily reflect the position of Villanova University.

