



From: [Gina Mason](#)
To: [ED, State Board of Ed](#)
Cc: [Gina Mason](#)
Subject: [External] PA State Integrated Science Standard Comments
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Hello Ms. Molchanow,

Thank you for providing this opportunity to voice my concerns on the proposed integrated science standards. While I am very excited to see the tremendous efforts put into updating our standards, I would be remiss if I did not comment concerning the lack of emphasis placed upon the Environment and Ecology standards at the secondary level.

Pennsylvania has been a leader in the nation on the environmental front. Not only did we utilize our natural resources to forge our nation, but we learned valuable lessons upon our mismanagement of our resources as well. For these reasons, Pennsylvania legislators saw fit to amend our state constitution to include the Environmental Rights Amendment in 1971. In 1993, Pennsylvania solidified its commitment to our environment by adopting the current Environment and Ecology standards. Once again in 2014, Pennsylvania stood up for our environmental future and signed the Chesapeake Bay Watershed agreement stating every student will graduate with the knowledge and skills needed to become environmentally literate. Unfortunately, as the proposed standards currently stand, this is not the case for the secondary level standards.

In the proposed integrated elementary level (K-5) standards, there is a separate EE Domain with corresponding Core Ideas. With the creation of the EE Domain, EE will continue to be viewed as a vital component of science. Well done for the K-5 level!

However, at the secondary level, the Environment and Ecology standards were integrated into oblivion. As the proposed standards currently exist, the perception is that only true sciences, as demonstrated via Domains are physical sciences, life science, earth & space sciences, & engineering, technology, & application of science, not environmental science nor environment and ecology. This does not align well with our constitution, or nor do the proposed standards prepare our students to address the daunting issues of climate change, pollution, loss of biodiversity, or resource depletion. 2020 was tied with 2016 for the hottest year on record with all ten of the hottest years since 2005 even though records were kept since 1880 (NASA/GIS). Temperature changes are not benign (Intergovernmental Panel on Climate Change [IPCC], (2018). Temperature impacts human health

(Center for Disease Control [CDC], 2020; Schramm, 2020), energy use (Environmental Protection Agency [EPA], 2017), agriculture (Tobin et al., 2017; Wolfe et al., 2018), water resources (Martin, 2021), natural ecosystems (Williams et al., 2020), infrastructure (Kim, 2019), economics (Bretschger & Karydas, 2019), national security (Busby, 2021; Pinson et al., 2021), and more (IPCC, 2018; USGCRP, 2017). In addition to global temperatures rising, droughts, floods, wildfires, extreme storms, land cover changes, sea-level rise, precipitation changes, and ocean acidification are all environmental issues predicted by USGCRP's report due to climate change. Unfortunately, these climate change resulting events are becoming routine (IPCC, 2018). Massive wildfires occurred around the globe in 2019-2021 including devastating fires in Australia, California, Brazil, the Arctic, and more (Masters, 2021). Climate change however is not the only environmental threat. Pollution, loss of biodiversity, and resource depletion are also major environmental challenges that need to be addressed (Kinslow et al., 2019; Szczytko et al., 2019). The Lancet Commission on Pollution and Health (2018) claimed that pollution is the number one environmental cause of premature death and disease worldwide. Pollution causes three times more deaths than from malaria, AIDS, and tuberculosis combined, as well as 15 times more from war and violence (Landrigan et al., 2018). While these environmental issues are daunting, there are actions that can be taken to mitigate these problems (IPCC, 2018; Landrigan et al., 2018; USGCRP, 2017, 2018). However, it will take a citizenry who is committed to becoming stewards of their environment, citizens who are environmentally literate (IPCC, 2018; Kinslow et al., 2019; Li & Monroe, 2018; Szczytko et al., 2019). The method to becoming environmentally literate begins with environmental education (Kinslow et al., 2019; Szczytko et al., 2019).

Environmental literacy is STEM. **There needs to be an EE Domain created at the secondary level as well. Our new standards should be strengthening the support to develop Environmental literacy, not diminishing it.** The concept of watersheds and wetlands are vital and are not specifically addressed in the proposed standards, neither are integrated pest management, agriculture, or environmental laws. Climate change, pollution, loss of biodiversity, and resource pollution concepts should all be incorporated into the new standards. With the billions of dollars being spent to address invasive species annually, the lack of these major issues is a huge oversight. While I understand the urgency to revise our outdated standards, PA should not be switching from 2002 to 2013 standards. Our new standards should not be outdated by eight years before they are even adopted! We should be purposely looking forward and addressing the issues of today and tomorrow! Our standards should be 2021 standards.

In order for our students to gain the skills needed to tackle the problems of tomorrow, they need to be equipped with the correct tools, problem-solving, critical thinking, skepticism, collaboration, creativity, openness to new ideas, intellectual honesty, empathy, grit, communication, growth mindset, data collection, analysis, teamwork, and curiosity. These skills are all learned

through environment and ecology. These are all skills of environmental literacy. These are also the STEM skills needed for our future workforce. Our schools should be incorporating meaningful watershed educational experiences into their curriculum to encourage these skills, hands-on, field/problem based, critical thinking, collaboration, real-world, problem-solving activities.

Thank you once again for the opportunity to voice my opinions. I am hoping Pennsylvania can continue to be a leader on the environmental front.

Gina R. Mason