



# A Clean City

## Water Filtration Labs with Annapolis Middle School

Project-based learning is a recent trend taking place in the science classroom. This type of learning provides students with a hands-on approach to their education, fueling engagement within the classroom. Emily Lamond, an 8th grade science teacher at Annapolis Middle School, regularly uses project-based learning in her classroom, with a focus on environmental science.



Her students are tasked with a year-round project challenging them to design an environmentally friendly city. One part of her curriculum involves teaching students about the complexities of water treatment plants. Emily wanted to tie this component into her classroom's year-long project, so she collaborated with

GaiaXus to develop the Filtration Lab, which challenges students to play the role of water treatment plant coordinator for their city.

The Filtration Lab simulates a scenario where students must provide their city with clean drinking water. This hands-on activity required students to design and test their own filtration systems using various materials. They begin by measuring turbidity levels before and after filtration by using the GaiaXus device, recording their observations throughout the lab. In order to successfully complete the lab, water samples must show a decrease in turbidity.



Students began researching water treatment processes and the role of filtration in purifying water. Then, they applied their knowledge through a hands-on design challenge. Using provided materials, each group designed and



constructed their own water filters. Students tested their filters to measure the reduction in turbidity. Through water quality testing and observation of other groups' designs, they refined their filters and incorporated other groups' elements to improve their filters. The final round of testing determined the group with the most effective filter—whichever group had the greatest decrease in turbidity was deemed the most successful. This project not only developed practical skills in design and problem-solving, but also fostered collaboration, critical thinking, and a deeper understanding of environmental stewardship among the students.



Throughout the activity, students were asked to record their qualitative and quantitative data. Most student groups were able to see a drop in turbidity, which supported their claims of a successful water filter. One group utilized sand in

their filters, and to their surprise, their salinity increased while their turbidity decreased. This phenomenon led to classroom discussion regarding the content of sand and whether or not it should be used when designing filtration systems.

The use of the GaiaXus device in this design challenge proved to be an engaging and challenging activity for Lamond's 8<sup>th</sup> grade science students. Students not only competed to achieve the greatest reduction in turbidity, but they also collaborated with their peers to adapt elements of their designs. This challenge encouraged teamwork while deepening students' understanding of filtration. By integrating real-world challenges into the curriculum, Lamond ensured that her students not only grasped scientific concepts but also understood their relevance. Through using the water quality device in the classroom, the 8<sup>th</sup> graders were equipped with critical thinking skills, problem-solving experience, and participation in scientific inquiry.

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✉ @gaiaxus

✉ [info@gaiaxus.com](mailto:info@gaiaxus.com)

🌐 @gaiaxus.com

🌐 <https://gaiaxus.com>