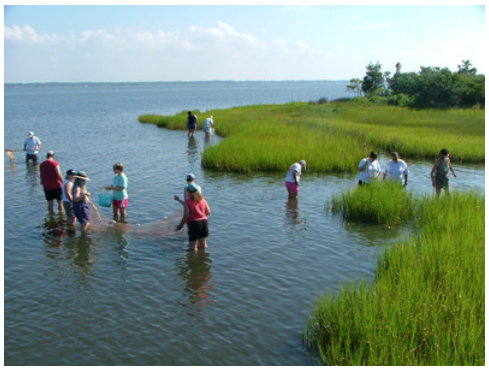
Environment & Health

Making Connections through Water Quality Investigations

The ***"Environment and Health: Making Connections through Water Quality Investigations"*** Teacher Institute was held at the Trinity Center in Salter Path, NC from July 13-18, 2008. This extremely successful teacher professional development opportunity was provided by funding from the 319 Nonpoint Source Grant Program, the Albemarle-Pamlico National Estuary Program and the UNC Superfund Basic Research Program to the Environmental Education Fund. The NC Office of Environmental Education provided administration and coordination for the Institute.



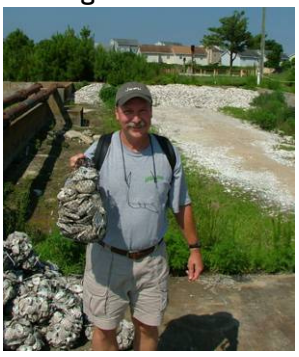
Purpose

This week-long teacher institute was created to provide teachers with an in-depth investigation of the diverse environmental science, health and civics issues related to water quality in NC and provide access to quality, science-based activities and resources that support the North Carolina Standard Course of Study Goals and Objectives in 8th grade science, Earth/Environmental Science and Advanced Placement (AP) Environmental Science.

Content and activities were specifically aligned with the NC Standard Course of Study for:

- Earth/Environmental Science (Goals 1 and 4)
- AP Environmental Science (Goals 4 and 5)
- 8th Grade Science (Goal 3)

By using the interdisciplinary approach of environmental education, educators learned how to address important water quality issues, including nonpoint source pollution and hazardous waste, with their students both in the classroom and in outdoor wetland environments. Participating educators received intensive support from an established network of educational partners who provided inquiry-based, experiential, and research-based instructional techniques for integrating water quality education into the curriculum. Educators participated in hands-on activities, site visits and investigations and technology applications correlated to the Standard Course of Study. In addition, each educator received instructional materials including curriculum-related videos, maps, posters, books and other support materials for use with their students. Educators also earned 4.0 Continuing Education Units (CEUs) required for the renewal of their NC teaching certificates and 30 hours of credits towards becoming Certified Environmental Educators in North Carolina.



Participant Demographics

Enrollment in the institute was high, with 33 of the possible 34 spaces filled. Only 32 educators attended the full week, as one registered educator was unable to come at the last minute. Participants came from the mountain, piedmont and coastal regions of NC. Fifty-three percent were high school teachers, 28% were middle school teachers and 19% were nonformal educators that work with a wide range of grade levels (K-12). Collectively, these teachers will have the opportunity to reach over 3,000 students in the 2008-09 school year in classes ranging from earth/environmental science to biology to ecology.

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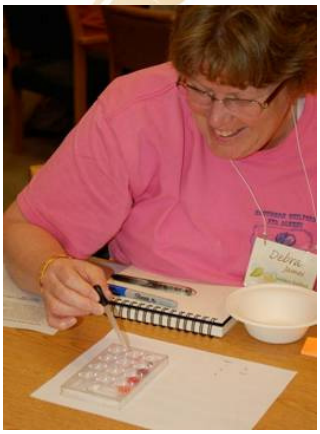
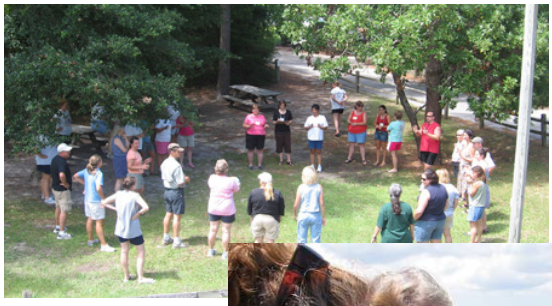


The educators averaged 13 years of experience, with a range of 1 to 36 years. The majority of educators had taught 15 years or less. Ten NC River Basins were represented (Broad, Cape Fear, French Broad, Lumber, Neuse, New, Tar-Pamlico, Roanoke, White Oak, Yadkin-Pee Dee) and 16 counties: Alamance, Carteret, Columbus, Davidson, Durham, Forsyth, Guilford, Haywood, Orange, Randolph, Rutherford, Scotland, Union, Vance, Wake, Watauga. One nonformal educator had a statewide presence and was responsible for reaching all 100 counties.



Institute Content

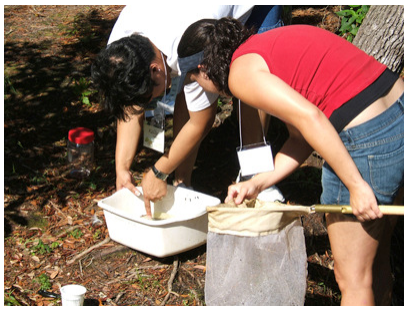
Educators participated in a variety of sessions, designed to build knowledge and awareness of water quality issues in North Carolina, and the skills to help students explore these issues and begin to look for solutions. Topics included journaling for science; exploring watersheds, estuaries and water quality; Project WET and It's Our Water workshops; NC Environmental Education Certification Program & NC Environmental Education resources; investigations of the relationships between chemicals, water quality, the environment and human health; and field trips to Sturgeon City, the Jacksonville Land Application Facility (Wastewater Treatment), Onslow County Landfill and Materials Recovery Facility, the NC Aquarium at Pine Knoll Shores and the Rachel Carson Research Reserve. The week concluded with an energizing panel discussion on emerging water quality issues in NC with the following panelists: Charles "Pete" Peterson, UNC Institute of Marine Sciences; Rachel Noble, UNC Institute of Marine Sciences; JoAnn Burkholder, NC State University Center for Applied Aquatic Ecology; Dean Carpenter, Albemarle-Pamlico National Estuary Program. The attached Agenda provides a more in-depth look at each session.

Facilitation

Our outstanding facilitators included staff from the NC Division of Water Resources, NC Aquarium at Pine Knoll Shores, NC Museum of Natural Sciences, NC National Estuarine Research Reserves, UNC Superfund Basic Research Program, Golder Associates, Sturgeon City, NC Division of Pollution Prevention and Environmental Assistance, Jacksonville Land Application Facility, Keep Onslow Beautiful, NCSU Center for Applied Aquatic Ecology, UNC Institute of Marine Sciences, Albemarle-Pamlico National Estuary Program and the NC Office of Environmental Education.

Overall Evaluation

100% of teachers responded that they believe the Institute overall to be an "Excellent" or "Very Good" experience. 94% of teachers indicated that the experience was "Excellent."



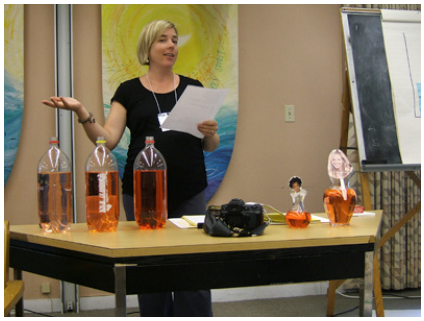
94% of teachers indicated that the institute exceeded their expectations, while 6% said the institute met their expectations.

100% of teachers indicated that they would recommend the institute to fellow educators. Several mentioned that they already had spoken to colleagues at home during the week of the institute and recommended it to them for next year.

- "Absolutely, this is the best, most well organized and useful workshop I have attended."
- "I will be recommending this to both formal and non-formal educators as an outstanding experience not to be missed."

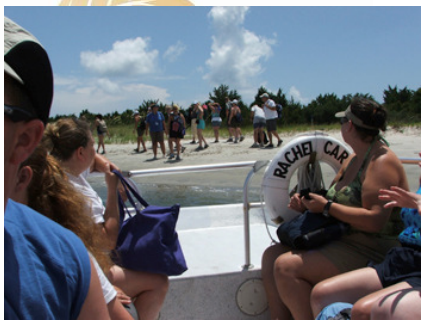
Training Effectiveness

100% of teachers said that their content knowledge in environmental education increased as a result of participating in the institute.



- "This workshop opened my eyes to non-point source pollution."
- "I was unaware of the many issues affected by stormwater runoff."
- "I live inland in the Piedmont and did not realize the impact of stormwater, even to the interconnection to the coast."
- "I understand groundwater, superfund, more in-depth NC water and environmental issues."
- "I learned more about coastal groundwater and also learned more about specific coastal issues."
- "The information on PCB's and the Ward site will be great to use for my students in the Triangle. My understanding of the big picture with all the topics has been greatly increased."
- "I am more aware of the effects of decisions we make in our lives and the consequences associated with them."

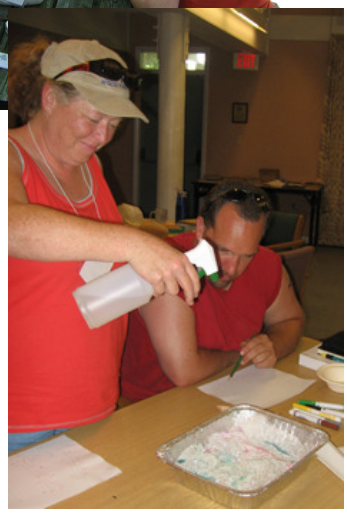
97% of teachers indicated that they will use some portion of the lessons or materials in their classes over the next year. Only one teacher indicated "no" for this question. He is retiring this year and the school system prohibits him from teaching for six months. However, he intends to come back to the classroom after that and indicated that he will be using the materials in the future.



- "I will probably use every single hands-on and inquiry lesson that the facilitators did with us. I am going to emphasize water quality in every one of my science classes in every possible way I can squeeze it in to the state curriculum."
- "Absolutely, positively excited about incorporating these wonderful activities in my classroom. I plan to take field trips to the local landfill, recycling center, wastewater treatment plant, etc.; leaf packs or D-nets and organism hunts; serial dilutions to make ppm (parts per million) real; water quality test kits have already been ordered; nature experience journaling; etc.

100% of participants indicated that the institute prepared them to teach their required curriculum in an interactive and investigative manner.

- "Presenters were very engaging. Unlike other workshops I've attended, these folks MODELED GOOD TEACHING!"
- "The fact that we actually did the activities as we were learning about the issues will make incorporating the investigations into lessons much easier."
- "We were taught (and engaged in) a huge variety of learning experiences that included investigation, analysis, assessment and a great deal of interaction - perfect recipe for thorough learning that we may now share with others."



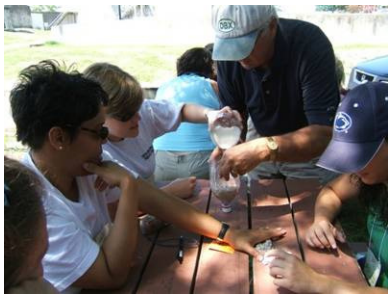
100% of participants indicated that their confidence level in teaching water quality issues, environmental education and/or science had increased.

- "My confidence level has increased and my excitement about the topic has mushroomed phenomenally. I'm so interested I can't wait for school to start. I might even have to go back to college to study water quality myself. Wow!"
- "Yes, being better informed about the current issues in NC will help me make my students better informed citizens for years to come."
- "I plan on teaching from a different perspective. My main focus will be the environment and I will incorporate land, air, and water. In the past I have used what we learned here as one unit, this year I will change. I am very excited about the coming year."

100% of educators said that the instructional materials they received will help increase student environmental awareness, interest and classroom performance.

-" Hands on activities will enhance and reinforce retention of concepts."
- "The inquiry and hands-on nature of the lessons and the emphasis on real-world and local issues will make a big difference."
- "It is only when students have direct experience of the environment that they can then have an interest in understanding and love for it. And only a love for the environment will commit them to conserving it."

Conclusions



Every teacher gave the institute an overall evaluation of "Very Good" or "Excellent." The content of the activities and materials directly fit into a wide range of science subject areas and every teacher was able to find a way to fit something they learned this week into their curriculum for the next year. The mix of middle school teachers, high school teachers, and nonformal educators worked very well. Several teachers mentioned in writing or verbally how much they enjoyed learning from a variety of different perspectives within the group.

The integration of health and environmental topics was highly successful – this holistic approach to exploring water quality topics such as nonpoint source pollution and hazardous waste supplied teachers with real-life, relevant examples of issues to take back and explore with their students. All participants indicated that the training was effective at increasing their content knowledge and their confidence level in teaching science, environmental education and water quality issues. Teachers benefited from the outdoor, hands-on sessions – a majority reported that their confidence in teaching outdoors increased as a result of participating in the institute. Participant satisfaction was very high and teachers enjoyed the variety of sessions, facilitators and contact with scientific experts in the field.

The pool of potential participants that are interested in and required to teach water quality and water resource topics as part of their curriculum is still quite large. Any funding available to provide another similarly-themed teacher institute in 2009 would be money well spent. In addition, an "advanced" teacher institute that provided opportunities for more in-depth exploration of specific water quality issues would be very well-received by the graduates of the 2007 and 2008 institutes.