Cold Spring School students completed an environmental research study on the Quinnipiac River. This project, funded by the Quinnipiac River Fund, provided our students the opportunity to investigate and collect data on the diverse wildlife surrounding the Quinnipiac River. Using this grant from Quinnipiac River Fund for handhelds and probes, we transformed our classroom. While the Palms were intended to be used as devices to collect scientific data, we soon discovered that they were a valuable tool in many other curriculum areas.

Students used handheld computers as data collectors, information organizers, calculators, and for data analysis. Students collected a variety of data about water quality including, pH, water and air temperature, dissolved oxygen, alkalinity. They also collected information on soil quality such as pH, nitrogen, phosphorous, and potassium. As biological sampling is also a direct indicator as to the health of the river, a database of possible plants, birds, fish, and insects was developed with the help of the River Keeper, New Haven Park Rangers, and Yale School of Forestry. With the use of the handheld computers, students accessed this database in the field and documented population samples at various sites along the river. Students took pictures with their Palm cameras to document the different types of plant and animal life. Using a digital camera, they took a series of panorama pictures to create virtual web cams at our testing locations. All of this data was analyzed in the classroom and posted on a virtual field guide to the Quinnipiac River. This field guide can be downloaded from our school web site to any Palm device. In this way, while the grant directly benefited two teachers and 20 students at Cold Spring School, now that the data is published on the Internet, all Connecticut teachers can use this resource to enhance their environmental studies. By the use of this handheld computer technology, student's data was generated locally and became published globally!
An interactive field guide for Palm handhelds was created. Using Palm handhelds, students can now interact and learn about their environment. We hope that as students learn about the value and diversity of the environment, they will also respect it.

We benefited in many ways. Taking small groups of students out to help the environment provides the opportunity for students to get hands-on science learning and the opportunity for the teacher to learn more about the students. Now and then there comes a surprise. A group of students went to the Fargeorge Preserve to collect data. This student was leading the group down a small trail that led to the river. Suddenly he motions the group to be quiet. He tiptoed carefully down the trail and snapped a picture of a bird using his Palm camera. We discovered that he had a passion for birds and a special talent of making his tall body invisible to birds, enabling him to sneak close enough to get a great picture. He was fondly nicknamed "Birdman".

Our students developed understanding through a process of asking questions, creating hypotheses, designing and carrying out experiments, and developing conclusions. Rather than learning many things on a surface level, memorizing vocabulary and facts with no connections, we believe that it is important that students develop a deeper understanding of science. They record how they are thinking in their science journals. In this way, I can easily find out what they understand and guide them to the next challenge. Students were able to bring their Palms everywhere. It was vital to the success of the project that they could use them to collect data at the testing sites. They could use it in the car to share testing results with parents on the drive home. They often beamed other

students testing information, so everyone had access to the data. It fostered school/home communication in many ways.

Our project's special interest groups were driven by inquiry. Using the Palms, students were able to record questions, share them with other students, categorize them into groups, and use the Palms as one of their research tools. Students shared information through the beaming feature. Students often went back to the original data to look at it in a new way. We puzzled over a low pH reading one day in the river by the school. Eventually it started a whole research project to figure out what was going on! We wanted to know if the soil or something at the bottom of the river was giving an acidic pH reading. The day we did the test was low tide. The students created a device that would go to the bottom of the river and open to collect water at that level. An old glass creamer bottle with fishing weights and a cork worked perfectly. Four students had to work carefully as a team to lower the device without pulling the cap early. After a few failed attempts, the device was successful and the team was working well.

It was remarkable how well our students did. Students took a responsible approach to their Palms. Technology facilitates learning. Curriculum integration with the use of technology involves the infusion of technology as a tool to enhance the learning in a content area or multidisciplinary setting. Technology enables students to learn in ways not previously possible. Effective integration of technology is achieved when students are able to select technology tools to help them obtain information in a timely manner, analyze and synthesize the information, and present it professionally. Our students shared the resource they built with students from other schools in New Haven. We hope many will use our Palm field guide resource.

Sincerely,

Karen Zwick