

## Chapter 25

# Developing a Web Application for the Integration of Real–World, Scientific, Problem–Solving into the Secondary Classroom

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### **ABSTRACT**

*In the 21<sup>st</sup> century, digital natives, born into a world of omnipresent technology, spend much of their lives online. However, many teachers still see the use of educational technologies as a challenge (e.g., Ertmer, 2005; Li, 2007). The authors propose that the familiarity and ubiquity of these media offer a valuable way to engage students in meaningful learning. In the last decade, the National Science Foundation has invested heavily in bringing technology into the K-12 classroom by funding an array of cyberlearning applications to investigate how they can transform student learning. Model My Watershed is one of those experimental platforms that integrates online learning with an understanding of the physical world within an interdisciplinary framework. This case study documents the development of this application from concept through implementation and beyond. It provides insights into the challenges of application design and deployment for those entering the world of cyberlearning design.*

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## **ORGANIZATION BACKGROUND**

Stroud Water Research Center was founded in 1966 and is one of the few organizations in the world devoted entirely to the study of streams and rivers. As a world-renowned scientific research center, in 1992, the Center established an Education Department to reach public audiences and 5<sup>th</sup>-12<sup>th</sup> grade students and teachers. For the last 20 years the Center's educators have engaged students, teachers, community groups, and others in a variety of hands-on, boots-in-the-water programs that teach both science and stewardship of fresh-water resources. Most of the funding for research at the Center comes from grants through the National Science Foundation (NSF). However, until recently, the Center's boots-in-the-water programs were the primary revenue source for the Education Department. With declining school budgets, the Department was no longer able to cover its expenses through such paid programming.

## **SETTING THE STAGE**

Since education efforts began at the Center, the Education Department staff focused on in-person, outdoor, environmental education experiences. Despite some organizational ambivalence, the Center's administration was interested in expanding the scope and reach of its educational efforts to include innovative ways to reach new audiences. A Center-wide, strategic planning effort led to a decision to seek a new Director of Education who would develop a broader vision for education programming. The planning effort also resulted in the recommendation to hire a Ph.D.-level scientist to lead the Education Department, with the expectation that the new education director would function as a peer to the research scientists and would explore external funding opportunities based on ongoing research undertaken by the Center. Consequently, in 2007, after an intensive evaluation of its needs, the Center hired a new

Director of Education with the expectation that she would bring the department's activities on par with the research departments, both intellectually and financially. This has resulted in a shift of focus towards large-scale grant-funded projects that explore the potential to reach new student populations via cyberlearning applications that meet students where they are - online. The new direction for environmental education was not without controversy, with both staff and constituents sometimes questioning whether such an expanded vision was appropriate.

## **CASE DESCRIPTION**

Shortly after she arrived at the Center, the new Director and a Research Scientist at the Center, developed a cyberlearning concept called Wiki-Watershed® in response to an NSF solicitation for cyberinfrastructure projects. The application was conceived as a suite of web-based applications that would provide the necessary tools to support an online community committed to watershed stewardship and education. When the Director presented the concept to the Education staff, they asked, "Why would we want to do that? That is not who we are." Although not hostile to the idea, the Education staff continued to be skeptical of the direction throughout the early development of the concept. The Director knew that getting the staff engaged in this new direction would be critical to her success.

Although the initial proposal did not receive grant support, the Director and the Research Scientists continued to pursue funding for the concept by breaking WikiWatershed® into separate modules to be created in a step-wise effort, thus making funding more feasible. The first module developed was Model My Watershed. The Director wanted this application not only to illustrate human impacts to local hydrology, but also to show how scientists use models and simulations to understand complex processes or make predic-

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