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| **Ingredients for a great STEM Project**  Anne Jolly October 11, 2017 [Education](http://www.smartbrief.com/originals/education) [Path to Workforce](http://www.smartbrief.com/originals/education/path-workforce)  My first STEM project came out of desperation -- before I’d ever heard the acronym STEM.  I had accepted an eighth-grade science position at a newly constructed school in Mobile, Alabama. That’s where I met “The Class.”  You know the class I mean -- the one where kids who seldom experience success come in thinking, “I don’t like science. I don’t like school. None of this stuff relates to me.” My carefully designed science lessons did nothing to change their minds. Worse, I kept hitting a wall as I struggled to build the vital student-teacher rapport so necessary for learning.  I tossed convention aside and decided to try a completely different approach with this class. The oversized asphalt parking lot at our new facility was creating problems. Runoff from the frequent rains was washing loads of sediment directly into a creek that fed into a local watershed -- and eventually into Mobile Bay.  I wondered what would happen if my disinterested class tackled this real-life problem. Since I had little idea how to tackle it myself, I asked an engineering professor from a local university for help. Dr. Kevin White willingly spent several days with the class -- steering them around campus and helping them understand the need and various means to curb the erosion damage. Mentored by Dr. White and several of his engineering students, the class decided on a wetland as a possible solution and chose a location below the parking lot to build it.  The student’s project interested the community. A local foundation funded us to purchase the materials, the PTA provided plants for the wetland with help from the Master Gardeners Association, and the students’ parents -- who normally came to school only for disciplinary conferences -- brought building materials and provided students food and drink while they worked. Chronically tardy students arrived before school with shovels, rakes, hammers and other tools needed to shape the wetland area and relocate plants.  While constructing a concrete weir to hold back water and allow sediment to settle out, students made some miscalculations and mistakes. Undaunted, they identified the problem and rebuilt it. Students who antagonized one another in classrooms began to cooperate and work together. Somewhere along the way, students in “The Class” connected with math and science and engineered a working wetland.  I like to look back at this project through a STEM lens. It’s easy to see what STEM principles made this wetland project successful:   * **Problem solving drives all STEM investigations***.* STEM lessons invite kids to address compelling social, economic and environmental issues in their lives and communities. This wetland project focused on a real problem. The kids related to the problem and were interested in solving it. * **A STEM problem must have several possible correct solutions***.* The erosion problem was open-ended. There was no single right answer and no formulaic approach. The kids chose a wetlands approach and, with mentoring, selected the design and plants they thought would work best. * **STEM projects integrate content from science and math courses to solve problems, combined with engineering practices and technology** In the wetlands project, math students understood exactly why they needed to calculate areas and angles to build a weir. They applied lessons about erosion, sedimentation and plants. They used technologies, from computers to shovels to weirs. And engineering practices brought it all together in a workable solution. * **STEM projects involve students in purposeful teamwork.**In this project, students once labeled dysfunctional worked together productively. Their teamwork went well in part because they were invested in the project, cared about the outcome and had more than enough work to go around. (For tips in successful student teaming, try my [free teaming guide](http://www.stem-by-design.com/wp-content/uploads/2016/07/Anne-Jollys-Student-Teaming-Tips.pdf).) * **STEM projects are risk-free environments.** A STEM class motto should be “No fear here!” Failure is part of learning**.** Students constructing the weir showed no discouragement when they failed to get the frame right the first time. In the construction world, redesign and rebuilding happen routinely. * **STEM projects lead to the construction of a real solution or of a model/prototype.** Their student’s work turned into a tangible outcome -- a working wetland -- more than just an idea on paper.   Some other STEM characteristics of this project bear pointing out: It involved student-centered, hands-on learning; engineering design drove students’ thinking and approach to solving the problem; students tested and evaluated the designs they constructed; redesign happened regularly; and, the project fostered a sense of ethics concerning the environment.  When I work with STEM projects, I deliberately include those same features. When my class did the wetland project, these emerged even though I didn’t know them as a grouping of characteristics representative of STEM. So even if you’ve never officially taught STEM, you might be a STEM teacher.  *Anne Jolly is a virtual community organizer for*[*CTQ*](https://www.teachingquality.org/)*and a member of the*[*CTQ Collaboratory*](http://www.teachingquality.org/collaboratory)*. She taught middle-school science for 16 years in Mobile County, Ala. schools and is a former Alabama State Teacher of the Year. She is the author of*[*STEM by Design (Routledge)*](https://www.routledge.com/STEM-by-Design-Strategies-and-Activities-for-Grades-4-8/Jolly/p/book/9781138931060)*, and she blogs regularly on*[*MiddleWeb*](http://www.middleweb.com/)*. Find her on Twitter*[*@ajollygal*](https://twitter.com/ajollygal)*.*  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |