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Challenge-based learning: José Garcia's innovative approach to student inquiry

This article discusses the instructional strategies of Greene County Middle School science teacher José Garcia. Mr. Garcia employs challenge-based learning, which marries project-based learning with student inquiry and makes effective use of technology. José Garcia received an Apple Distinguished Educator award in 2009 and was Teacher of the Year in his school and county in 2008-2009.

BY DAN LEWANDOWSKI

Attention teachers!

If a colleague, explaining his unique instructional approach, told you he

- covers in two weeks all of the grades 6, 7, and 8 Standard Course of Study requirements that formerly took him five to six weeks to cover;
- covers, in 45- to 55-minute classes, all the grades 6, 7, and 8 Standard Course of Study requirements for the school year two months ahead of end-of-grade exams;
- assigns no homework;
- gives no "paper and pencil" tests;
- facilitates more than teaches — i.e., allows his students to do most of the teaching;
- has plenty of time to help struggling and exceptional students "one-on-one";
- has plenty of time for classroom discussion and special projects;
- never grades papers after school hours; and
- guides his students to a **98% EOG pass rate**,

would you pay to learn his secrets?

Please make all donations to the charity of your choice because in the following paragraphs, you'll read about his methods absolutely free of charge and with all best wishes for your personal success in employing them.

Science teacher José Garcia in his classroom at Greene County Middle School. (Photograph by the author. More about the photograph)

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Hybrid pedagogy

Greene County Middle School science teacher José Garcia, who received an Apple Distinguished Educator award in 2009 and his school's and county's 2008-09 Teacher of the Year designation, calls his innovative pedagogical approach "challenge-based learning." It is, he explains, a combination of project-based learning and inquiry-based learning.

He begins by consulting the NC Standard Course of Study (NCSCOS), noting his goal, listing all objectives for that goal, and formulating an "essential question" to pose to his students. For example, the NCSCOS science Goal 6 for Grade 8 relates to cell theory and function. Mr. Garcia's essential question is: "What structures, functions, and processes do I have in common with plants, animals, or fungi?"

He then formulates a long list of specific questions he knows his students must be able to answer to demonstrate mastery of the material. For Goal 6, for example, he devised 38 separate questions, ranging in complexity from "What is a cell and what does the Cell Theory state?" to "How does deoxyribonucleic replication occur?" [See sample assignment sheets.]

These questions cover the material that, employing traditional teaching methods, he would need to elucidate for his students one at a time. During four years of traditional teaching, Mr. Garcia learned how difficult it was not only to cover the material but also to keep all students engaged all the time: the quick learners became bored and the slow learners fell behind.

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- Wall-to-wall project-based learning: A conversation

Fostering collaboration

Mr. Garcia then divides the questions into six groups; divides the class into six groups of — usually — four students each; assigns each group of students one group of questions; and imposes a deadline for the work to be completed.

He allows the members of each team to choose a leader and decide among themselves the question[s] each member of the team is responsible for answering. Then he "turns them loose," first in the classroom, where online research is conducted, then in the laboratory where hands-on learning occurs.

During the process, each student is formatively assessed on both his/her individual performance and his/her performance within the group according to rubrics he/she receives at the same time as the assignment. [See sample blog rubric and sample lab rubric.] During the school year, every student must lead a group and no student may lead a second group until all students have led at least one.

At the beginning of each project, each leader receives a button to wear, on which are inscribed the words, "Yes… and" to emphasize, Mr. Garcia explains, "that there are no dumb questions." Mr. Garcia allows only the leader of each team to address him about team-related issues because he wishes the students to resolve as many problems as possible on their own.

Reporting in the paperless classroom

After the deadline, each group presents its findings and conclusions on each of the individual questions to the class as a whole. Because Mr. Garcia's classroom is essentially "paperless," the students' presentations are generally in the form of sharable blogs that may include photographs, animation, audio/video clips, etc. [See sample blog image.]

Like all other activities in Mr. Garcia's classroom, the presentation phase is completely interactive. "While some students are presenting at the front of the room," he explains, "other students are at the back of the room tracking the information on graphic organizers or Thinking Maps," which are immediately available to everyone in the class electronically.

This practice, Mr. Garcia says, frees individual students from taking notes, thus allowing all students to ask questions, request clarifications, volunteer information, share similar findings, suggest related paths of inquiry, etc.

It also, Mr. Garcia continues, accustoms students to hearing and accepting public criticism. "We critique everything, all the time, from issues of fact to font colors." Not all students embrace the practice readily, he admits, but by ensuring that all criticisms remain impersonal and soothing hurt feelings by explaining that true scientific inquiry requires rigorous questioning, he maintains peace and decorum in the classroom.

During these sessions, he explains further, vocabulary is developed. "Every science lesson contains dozens of unusual words — we could spend entire days on rote memorization — but because all of the students investigate similar issues in their groups, everyone gains a general familiarity with most of a given lesson's important terms and concepts. When we discover a particularly difficult term during our discussions, we agree, by acclamation, to add it to our classroom 'word wall.'"

By the end of the presentations, every aspect of every NCSCOS goal and objective has been explored and discussed in depth; every student has shared his/her newfound "expertise"; and every student has access to comprehensive notes, lab reports, and research results covering every aspect of every goal and objective.

A guide and a facilitator

"I don't see a down-side to this way of teaching," Mr. Garcia declares. "Students enjoy labs, they enjoy technology, they enjoy guiding their own learning, they enjoy working in teams, and they enjoy sharing what they learn and learning from each other.

"And purely selfishly, my job is both easier and more rewarding than it was when I taught traditionally. After the kids understand the method, and after I present them with instructions and rubrics for the project, mostly I sit back and watch and learn. I don't even answer questions directly." When students approach him with seemingly intractable

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problems, he guides and encourages them to discover the solutions on their own, using logic, Web resources, and/or lab exercises and experiments.

"I'm a facilitator, a mentor," he says. "The hardest part of my job is to dream up new challenges, which I must do constantly because the kids adapt and learn so quickly."

Student productions

For each major unit, Mr. Garcia requires the student groups to create a final product. Depending on the levels of technological sophistication his classes have achieved, this may be as simple as a blog or as complicated as a mini-motion picture.

If he assigns a movie, he enlarges the groups because of the numerous production jobs — camera operator, audio recorder, actor, director, writer, costume designer, set designer, etc. — that must be done.

He then provides a list of items that must explicitly appear in the films — for example, certain terms must be defined, a character who portrays a practitioner of a relevant "real-world" profession must appear, etc. — but, he emphasizes, "I let the kids do what they want as much as possible. I promise not to interfere unless they get lewd or present something that might be ethnically or racially offensive."

His recent classes, he admits, created some fairly gross stuff, as should be expected from students of this age group: mysteries spotlighting killer diseases, horror stories featuring gruesome deaths, etc. But if you allow for "creative differences" and look for substance in the films, he contends, you'll find it, along with surprising entertainment value. [See sample movie clip.]

Devising the method

Mr. Garcia admits that serendipity played a major role in the evolution of his innovative methods. First, as noted above, he knew from experience how challenging NCSCOS goals are to reach for teachers using traditional pedagogical methods. Second, he was offered and accepted the position of technology director at Greene County Middle School just as the Greene County LEA initiated, with the help of a generous grant from the Golden Leaf Foundation, a one-computer-for-each-student program in grades six through twelve. And third, while doing graduate work at the UNC-Chapel Hill School of Education, he was exposed to cutting-edge research into project-based learning, inquiry-based learning, gender-based learning, Bloom's taxonomy, etc.

"During my two-hour drives to and from Chapel Hill, I'd think about how to combine our terrific new technology with these terrific new education theories," he explains. "I *believed* my ideas would work in the classroom, but needed to figure out how to put them into practice."

Implementing the method

Mr. Garcia confesses to feeling major trepidation when, at the beginning of the 2008-09 school year, he launched challenge-based learning. Not only had he never tried this style of pedagogy, but also none of his incoming students had experienced a learning environment remotely like the one he was about to introduce.

"I knew that during the first nine weeks I would be teaching *methods* more than lessons. Before I could expect the kids to take charge of their learning, I had to teach them how to do it." During those early weeks, according to the pacing guide, he and his students fell further and further behind. "But I had made a commitment to myself and my kids, and my principal supported me every step of the way."

And so he persevered.

And to his great relief and gratification, he succeeded — much faster than he expected. "Once the students understood the concept, and once they realized how much freedom they were allowed, they were off and running."

Replicability

Mr. Garcia admits that the LEA program that provides computers for all his students contributes to his success. "The kids love the hardware, and software like the iMovie package certainly makes things better for everybody." But he knows from his days as technology director that computers have bugs, software has glitches, and servers go down. He also knows that budget constraints might curtail the program at any time. And so he's built flexibility into his methods. "Last year the computer system here at school went down for a week," he reports, "and the students and I adjusted easily. Challenge-based learning also will work in schools that have computer labs instead of the luxury of one computer per child."

A final anecdote

Mr. Garcia's wife, Kelly, is a language arts teacher at Greene County Middle School. One evening last winter, halfway through grading a pile of papers, she walked into the living room where Mr. Garcia sat watching a basketball game.

"Must be nice," she said.

"You can do it, too," he replied.

"But the language arts are different from the sciences."

"Yes. But my method is transferable."

This year, Mrs. Garcia began employing challenge-based learning in her English classes. To her pleasure, she has been bringing home less work than in past years, and her students seem to be absorbing their lessons as well as or better than in the past.

"The method will work for all disciplines," Mr. Garcia states unequivocally.

Don't believe it?

Send him an email message. Mr. Garcia is generous with his time and eager to share. He'll be happy to talk to you.
