

Where's the Science?

Mark J. Volkmann

This closed case describes a dilemma faced by Juan Verde, a beginning teacher who uses student-centered, problem-posing pedagogy to teach seventh-grade science. Mark presents the case from the point of view of Luke Andrews, a teacher who is responsible for evaluating Juan's teaching performance. As revealed in the case, Juan helps students examine local issues by encouraging them to choose questions, design investigations, gather information, and develop creative presentations. Luke visits on the day students are giving their presentations. He likes what he sees but is troubled by what appears to be the absence of a school board-approved science curriculum. This case demonstrates how power and control issues impact curricular and pedagogical decisions and that beliefs about what constitutes good science teaching are philosophically and politically constructed.

Luke Andrews walked briskly out of the Winona Middle School central office and headed toward Juan Verde's classroom. Luke taught high school chemistry, but today he was visiting Juan's seventh-grade science classroom in his capacity as Chair of the Winona Community School District's Science Department. Part of the Chair's responsibilities include serving as a member of the evaluation team of all nontenured employees. This was Juan's first year of teaching, and Luke was assigned to head Juan's evaluation. Juan taught seventh-grade science in the newly erected science wing of Winona Middle School. The science wing consisted of three classrooms that opened into a shared conference/computer space, called the pod, which connected to the school library through a short hallway.

As Luke walked through the library, the fifth-period bell rang. Students poured out of the adjacent classrooms into the hallways. As he walked, he recalled that the

last time he had visited the middle school was during Juan's job interview last summer. Three applicants had been chosen from a pool of 45 for the final round of interviews. Juan was selected as a finalist because he had excellent credentials and because the district wanted to increase the ethnic diversity of its faculty. The final decision was based on which applicant had the most potential as demonstrated by his or her teaching expertise. The three applicants were given a choice of topics and asked to develop a lesson to teach at the job interview. Juan chose the topic of water pollution. He furnished photocopies of a newspaper clipping about nitrate contamination of Winona's drinking water to each member of the committee. Then he initiated a series of activities to help participants clarify the problem by listing what they knew about the quality of their drinking water and what they wanted to find out. By the end of the demonstration, each participant had written a question he or she wanted to address.

Luke enjoyed the investigation of a local issue; however, he had wondered how well Juan's approach would work in a middle school classroom. Luke approached teaching more traditionally: He encouraged students to read the text and perform laboratory experiments associated with scientific principles. Luke also wondered how well Juan would get along with Jackie Finn and Warren Olson—the two veteran members of the middle school science staff. The committee chose Juan in spite of Luke's reluctance because they believed Juan's problem-posing approach would stimulate the science department to grow professionally. Luke believed that their choice also had a lot to do with the recent increases in the Latino population of Winona.

As Luke entered the pod, he surveyed the four new computer stations located along the walls between the classroom doorways. The one nearest Juan's door was occupied by students. Seeing no teachers in the pod, he wondered how their activities were being monitored. Just as Luke was about to enter the classroom, the door opened with a jerk and out popped a seventh-grade girl, who side-stepped Luke and dashed down the hallway to her locker. Luke, regaining his balance, entered the classroom. The room was nearly empty. One of the remaining students said Mr. Verde had taken a phone call. Luke made his way to a desk in the back. He surveyed the classroom and noticed how different Juan's room was from his own. The teacher's desk was in the back, instead of the front; student desks were arranged in small clusters, instead of neat rows; and the walls were covered with student drawings, posters, and charts, instead of the periodic table and posters of famous scientists. The drawing nearest him read: "United States bridges are in poor shape! What's the condition of the Winona suspension bridge?" Luke chuckled to himself at the drawing that showed snapped cables and crashed cars on the Winona suspension bridge.

Students began to enter the classroom and talk in small groups as Luke waited for Juan to appear. As he waited, he read the file he had picked up from the central office. It contained four documents: Juan's lesson plan for the week, a note from a university scientist, a complaint lodged by Finn and Olson, and a letter from a parent:

- Today's lesson plan was brief. It read "presentation of student air and water pollution projects."

- The note was from a scientist at the local state university. It was an e-mail response to questions asked by students from Mr. Verde's class about air and water standards.
- The complaint dealt with noise and constant activity in Mr. Verde's class. According to Finn and Olson, Verde's students occupied the conference area and library more than they occupied the classroom.
- The parent letter stated:

Dear Mr. Verde,

I was truly surprised when you called last week and informed me of my son Mike's progress. It's the first time I've received *anything* positive from the school. With only one adult in the house, Mike has had to grow up fast. He fixes breakfast for the family (me and his younger brother, Alex). After school he looks after Alex and fixes dinner (I get home about 7:00). I know I depend on Mike more than I should, but Mike likes to be in charge, and I think that's why he likes your class. He told me that he's the leader of a team that's investigating the widening of Lindberg Road. He's very proud of that. I'm glad you're teaching at Winona Middle School. You've made a difference for Mike.

Thanks,
Pete Anderson

Luke looked up from the folder as the bell rang and Mr. Verde calmly entered the classroom. Students took their seats as the PA squawked announcements and Mr. Verde took roll. Juan introduced Mr. Andrews, then asked Lisa (the student who had earlier rushed out of the room) to introduce her group and their project. Mr. Verde sat at his desk as Lisa and her team assembled in front of the class:

- LISA: (Standing) The question my group decided to investigate is "Why does the city want to widen Lindberg Road?" We chose this problem because everyone on my team either lives on Lindberg Road or lives near the wetland that Lindberg crosses. We have decided to have a mock hearing conducted by the city manager. Mike plays the role of the city manager, Lou is a conservationist, and I'm a home owner.
- MIKE: The city is talking with state and federal agencies to get money to make improvements to Lindberg Road. The reason we are holding this meeting is to find out what the community thinks about this project. Lindberg Road is in lousy condition. It's got potholes and it's too narrow, and in the place where it crosses the wetland, it's sinking. Besides that, the number of cars on Lindberg Road is going to increase from 5,000 to 10,000 cars per day in the next 10 years. Unless we improve the road, it will not be safe.
- LISA: What makes you think the number of cars will double in 10 years? Right now, our population is increasing at a rate of 2%. A 2% growth rate doubles the population every 35 years, not every 10 years. Why do you think the number of cars will increase by that amount?
- MIKE: Because the state is planning to connect Highway 39 with Interstate 56. In 3 years, the traffic on Lindberg Road will increase because of this connection.

- LOU: As a resident of Winona, I agree that Lindberg Road should be repaired. But as a conservationist, I do not understand why the city wants to double the width of the road. This will damage the wetland.
- MIKE: If the city gets a grant from the federal government, they will pay up to 80% of the cost. But the federal government will only help if we're building a four-lane road. Federal assistance is unavailable for the repair of two-lane roads. The feds require us to replace every square foot of damaged wetland with 3 square feet of new wetland.

Luke was pleasantly surprised at how well these three understood the issues. Lindberg Road passed right by Luke's front door, yet these students understood the situation better than he did. However, Luke was somewhat dismayed because these students appeared to be learning more about social issues than they were about science. He wondered if Mr. Verde ever used the textbook.

Luke spent the remainder of the class observing groups present their investigation of local problems. Each group had chosen a different problem to investigate. Topics included Winona's superfund waste disposal site, nitrate contamination of the local water supply, failing bridges, wetland preservation, household carbon monoxide poisoning, household radon poisoning, and the future merchandising of electric cars by local car dealers.

After class, Luke interviewed Juan. He began by complimenting him: "The quality of the students' projects was fantastic, and their attention span and respect for one another were better than I have seen anywhere. However, I must tell you that I am deeply troubled by the absence of the district's science curriculum from these projects. Are you covering the topics?"

Juan responded, "Thank you for the compliments for my students. I have tried to teach them how to investigate questions that are interesting to them and important to the community. I have also worked on how they show respect to one another. I am sorry that you question what my students are learning. I feel that students learn science best when what they learn is connected to their own lives. I believe that, as students understand more and more about their community, they become more sophisticated and their understanding of the world and of science increases. I do not think that science can be taught solely from texts; furthermore, I believe that laboratory science is meaningful only when the experiment is relevant to the students' experience."

Juan's words burned in Luke's ears. Everything he valued about science teaching was being challenged by Juan's philosophy of science teaching. Luke thought to himself, if only the job committee had listened to me in the first place.

Later that night, as Luke wrote his observation summary, he neglected to repeat the compliment he had made to Mr. Verde about the quality of the student projects. Instead, he questioned the apparent absence of the district science curriculum from Mr. Verde's lesson plans. In addition, he cited the note from Finn and Olson, his near collision with a student before class, Mr. Verde's last-minute arrival to class, and the general commotion in the classroom as evidence of poor classroom management. He suggested that Mr. Verde work closely with Ms. Finn and Mr. Olson to develop better classroom management strategies. Furthermore, he recommended

noise level checks outside of Mr. Verde's classroom and follow-up observation sessions to make sure Verde conformed to district science curriculum guidelines.