Scott teaches Earth Science and AP Environmental Science at a 9-12 school

Before POD I used a Smartboard, but I didn't use individual computers much for students. I would say most of it was presentation, so I did use GIS, older versions of it. I participated in another NSF-funded PD for teaching with geospatial technologies similar to POD. At that time the software that they were giving us wasn't quite as intuitive. I was using it but I was just using it to demonstrate.

I teach in a very large well-kept school. It does have resources. It's considered Title I. It's a pretty diverse mix. It's not dramatically different in terms of one ethnicity over another. It's still predominantly white with Hispanic, African American the normal list, pretty much.

We have a district test for every class. And in my AP Environmental Science class I have an AP exam. But I get there, there's nobody telling me the road I need to take to get there. So it's kind of like "this is where we want you to be successful in these things, but we're very open to how you get students there to be successful."

Administrators are supportive, within reason. I mean they are not dropping thousands of dollars my way or anything. The first year as part of POD I implemented a climate lesson where the students were to design a weather measuring device and then explain why they would do it based off of looking at maps and determining the climate. So I did utilize that in my AP class. And I have additional lessons that I've also put into play of my own.

I haven't taught the climate project again but I will. I liked a lot of the resources. I just modified it a little bit, based on what I saw the first time I used it. I was taking on a lot as a teacher during my first year teaching AP Environmental Science. It was my first year getting a lab up and running in my classroom that could use GIS. So there's a lot of firsts in there. And so I kind of stumbled through the lesson. But I also did find some really good points and some really good things to change and to utilize. So I'm using it again. Claims and evidence, we did that. We do a lot of similar lessons. There are a lot of real world problems that we address, especially in the AP class. It's all really based on the real world problems.

It's tough for me just to do exactly what somebody else gave me. So it always seems like I integrate and so a lot of that pedagogical stuff was definitely integrated in. The first time I taught the lesson I implemented the way it was written. And it was fine. But it I modify and all of a sudden it's become my own.

In AP environmental science we use ArcGIS almost every week. The students are touching it. The earth science class doesn't use it but they see it a lot. Then the new class that I built on campus is a GIS elective and they use it every day. It's a science-based class where students learn how to use GIS and then answer questions. For example, the project we enacted was to suggest policy change on our campus. Last year they changed the district permanently with the information they were able to bring forth.

Our high school was the #1 user of electricity in the District. We were consuming electricity far more both per capita and just as a school in general than the other 5 high schools. The students were given

the task of reducing electricity consumption on a campus. With the use of GIS, they monitored the campus by first learning how to make layers. They turned every building into a polygon shape and they also implemented some other layers in there. But really the polygons became powerful because they mapped data collected by the janitorial staff about which lights were turned off and which items that use and abuse power were left on. They used the map as a motivational tool for teachers. So you could see a map pop up and your building was red. Uh oh, what are you doing? Well you're leaving your lights on, your computer on or something like that. They also worked with administration to change the way in which the janitorial staff does their rounds. They used to spread out all over the campus, so the lights would be on all night long and the power would be on all night long. With administration's help, they came up with a different system to where they all worked together. The janitorial staff can also use GIS to talk about hours: Where are you are you going to spend the most hours and how you can reduce hours? They also looked at the air conditioning units and when they were on and off. They graphed them. They applied them to the square footage of the school and talked about that kind of stuff. Basically they told the District: "we're going to reduce your energy consumption by 20%." The District laughed and said try for 2%. They got 14%. It came out to $9,400.00 a quarter on one campus. Pretty cool. And so then, now that's implemented at all the campuses now, they all do the same thing. All the high school campuses do the same thing. We were recognized as a Green Ribbon School for their efforts.

From that experience, the kids really saw how powerful this tool could be to empower themselves and also to make change. It promoted student efficacy. The students realized that they have power. That they have influence. So those are all really good attributes that came out. Then of course, there were the little lessons learned along the way.

This year we're doing it again. We're not looking at energy this time around, this time we're looking at water consumption on campus. What we're doing a little bit differently is we're incorporating a science fair into it. So it provides the student a format. The first time we acted as an entity that was here to help. Now we're acting as scientists and there's more scientific practices to follow such as developing and testing hypotheses.

When we look at a person and say ok you're ready for career, or college, or you're ready to go on to do something, communication is a big part. Can you communicate? Students had to communicate with professionals. We had GIS professionals come in to ask them questions. The students had to ask questions. They had to communicate with the administrators about action. Then they had to communicate with the support staff, the janitorial staff. All three come from very different aspects of life. You have to think: how are you going to get them all on board to make this kind of change? Communication was there. Data, they had never touched GIS prior to that. That was the first time.

I know it was effective for building student communication, technology skills, and data skills but we're trying to say more about how this type of project affects learning. Before, it was let's do the project. Let's make a difference. There was a lot of learning but I don't know whether it equated onto the AP exam or not. So now this time around with that scientific method approach and trying to integrate a little bit more of, "yes we're going to make change as we go along" we're also going to try to hit key

points and see if that empowers the students to not only feel good about themselves and have all those organizational skills that come with project building, but also have content knowledge. We're carefully going to try to increase content knowledge this time.

It was so engaging that that's one of the reasons why I think curriculum kind of suffered. I don't like teaching to a test, but you can't say ok now I'm going to do a lecture on something when we just did 3 days of going out collecting data, looking at the data, talking to adults, making sure the adults understood what we were trying to tell them. Ok now let's play teacher/kid again. You know what I mean? So there was such engagement in this project that it was tough sometimes to reel them back in to the content. So now, that's why I'm trying to integrate more content into the project. It's because it's just really tough to say, ok stop.

This time there was no formal assessment. It was successful. That was the assessment. It worked. The kids changed things. Now that means this time we're going to have come up with some way to assess student learning. There is a pre and there is a post assessment. Of not only their qualitative attributes like communication, empowerment, organization, all that kind of stuff. There'll also be a pre and post assessment on their content. Also, I hope to compare the results from these kids' AP tests to last year's kids' AP tests when content is now added to the project.

I think this project couldn't have happened without GIS in this particular case. There are other projects that I've done that GIS acted as an icing, you could say, but in this one you couldn't have made it happen without it. It was helping student learning. Sometimes when you first use it it's a distraction because you're dealing with that technology where you're, you know, is this going to work? Is it going to glitch up on you or freeze or whatever? But once you get past that it can be a nice tool for the teacher. And we use that a lot in our Earth science class. The students get a lot more demonstrations that involve a map and the map becomes more static, meaning it's on paper. So we take a GIS map and we'll put in on paper and they'll utilize it. It's tough to say. I love GIS. I'm really into it. If I put it into the hands of my other science teacher who has no interest in it I don't know if it would be the same tool.

In the past I dabbled a lot in GIS . I just liked it. But I used it, only, for my teaching, just to show. This is kind of cool how it's kind of evolved. I've become enlightened. I mean I knew it was there. I saw it as a tool to use for teaching but now I definitely see it as a tool that's in a kid's hand. I didn't see it that way before. It's kind of right in front of you and oh yeah, put this in the hands of a teenager and let's see what happens.

I did not get any IT support. I had to do all the lab creation and software uploading computer crashing, fixing myself. I joined the POD crew and came back with just such a thrill for it. I told my administrator, you know, you signed the paper saying you would support me to implement. What are we going to do? How are we going to do this? And we were able to scrounge up 7 unused computers and from that we built. We had really poor screens to start out with, I mean hand me, hand me, hand me downs. They were gigantic so the kids had a tough time. Then also we had to upgrade the RAM in our lab. We were given 1GB and that was just crashing terribly. And so we had to find the funding to up that, and we did. We added additional RAM. We got new monitors now. And they all sit in my classroom on rolling carts.

So it just becomes so accessible like let's stop for a second, the computers were turned on when you walked in, now turn around and let's play with this and let's figure something out. So I don't have to share. So there's a barrier taken away. I don't have any restrictions on when I can use it, how often I can use it, and you know how they work. Now you know which computer needs a kick and which one doesn't. So the creation of the lab has broken down a barrier of getting ArcGIS in the hands of the students.

I teach in an interesting district. It's slow on the technology side. It's kind of reluctantly moving that direction but over the last six months I feel more like, "Hey good you're doing that. You should keep doing that. That's something good." You know what I mean. Never was there a memo saying use more technology. I had administrative support from my principal.

Another teacher is a good friend of mine. He also went through the POD program with me and it wasn't like 100% of the time we were team teaching, but if there was team teaching to be done, he would come in and help, because he had that background from POD. He's a chemistry teacher so he doesn't get quite the opportunity to teach with GIS. But anytime we go on a fieldtrip, he is with me and he's collecting data with the kids with me and if he has time when we get back, helps input it but, doesn't really use it as a teaching tool. Now during POD he did. He taught a lot during POD but not now. It unfortunately doesn't fit well with chemistry.

The kids are always saying things like, "wow this is more fun than I thought this would be." Because sometimes when you tell them we're going to work on computers, they're not sure what you're going to make them do. And then there are also those frustrating moments where the program just doesn't want to do what you want it to do.

It's been very rewarding. And I like the fact that I've kept in contact with the POD crew. That's rewarding in itself. And also it just feels good, you know.