EDUCATIONAL SERVICE DISTRICT112

THE SUSTAINABLE CLASSROOM PROJECT

Middle School Case Study: Lynn

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About Lynn

Lynn is a veteran teacher who has taught for 29 years. Her mother was an elementary teacher who taught several different subjects and levels including a position as a science/computer specialist in an elementary school. Because of her mother, Lynn knew she wanted to be a teacher. During high school service projects she worked with special needs students and decided that was the population she wanted to work with. In teacher's college, she majored in Special Education and worked in a recreation program for the handicapped, first as a volunteer and later as a paid staff member.

When Lynn got her first job, she couldn't believe that she was actually getting paid for something that she loved to do! Lynn taught Special Education classes for eleven years working with the moderately handicapped population in a self-contained classroom and then in a resource room with a range of disabilities. She took a leave of absence for one year to go back to school early in her teaching career to get her Masters in Education. While taking classes, she worked as a teacher's assistant for one of her professors. After teaching Special Education, she taught fourth grade for many years where she had the opportunity to work with a great team of teachers who shared their ideas and strengths. For the past eight years, Lynn has taught 5th grade, with five of those years in a middle school setting.

Lynn teaches middle school level students in a small town located on the north bank of the Columbia River in southwestern Washington. The school houses fifth and sixth grade students. Fifth grade has a wide curriculum including Explorers up through the Westward Movement in Social Studies, and Foss Kits are used for Science. The major units in Science are Geology, Nutrition, and Models and Designs. Technology has been used to get real time data for the unit in Geology. Students access an Earthquake reporting site and track the location of recent earthquakes on a large map in the room using dots. They discover the plates as a pattern is formed. For research on individual states in the spring, students go to a weather reporting site and keep track of the high's and low's of their state's capital for about ten weeks to make a line graph in Excel.

Using classroom technology to enhance teaching and learning has been a high priority for Lynn in the past years. Her classroom houses seven computers (three new ones last year). She regularly rotates students onto the classroom computers to work on current projects, and her class spends 45 minutes per week in the school computer lab. Students research assigned topics on the Internet, compose paragraphs, embellish papers with word art and graphic images, access the school library, and virtually "attend" real-time events for authentic learning. Lynn increases her effectiveness in teaching by using a variety of productivity and communication technologies. She communicates with parents via email and uses PowerPoint presentations for parent meetings. In addition, Lynn uses the computer for classroom materials preparation, grading, and daily attendance and uses word recognition software to help lower performing students access the classroom materials.

School district service also is a priority for Lynn. She served on a committee that developed the first technology plan for her district, and later helped put together a three-year technology plan and write the portion to meet the requirements for ***No Child Left Behind.*** She continues to serve on committees that recommend expenditure of district technology funds. In addition, she serves on the district's art committee and is helping to develop art tubs at her grade level.

Through the years, Lynn has been the recipient of a number of technology-related grants and initiatives and has come to be viewed as a technology leader in her school district and in the state. She was a participant in the TELDEC I, II, and IV grants, and was named a "Pathfinder" teacher in TELDEC IV project, in which her role was to mentor selected teachers around the state of Washington using the K-20 videoconference network. Lynn has also participated in several other grants: a classroom Gates grant, later becoming a grant reader for future teacher awards; a Special Education Technology grant, receiving software and training to help students with disabilities (e.g. WYNN Wizard, CoWriter 4000, Write Aloud, Inspiration, etc.); and "Engaging the American Past," developing history curriculum projects using primary sources on the Internet.

Lynn's Classroom

Introduction

Lynn applied for the Sustainable Classroom Project because she was looking for ways to teach her students that would engage, motivate, and help them increase their achievement. As well, she was excited about trying out the new technology offered through the grant. She said, "I would benefit from the training and hardware that are sustainable and that will be part of my classroom on a long-term basis."

Currently Lynn teaches all subjects in a self-contained 5th grade classroom. At the beginning of the year, she had a class of twenty-eight students. Her class had five or six students who were characterized as high achievers, several who were low achievers and, the rest fell in the average range of achievement. The majority of her students were white, non-Hispanic (22, 79%); the remaining six students were of Asian and Pacific Islander and American Indian ethnic heritages. Lynn wrote the following about her students' socio-economic make-up:

> *The socio-economic make up of my class varies. The population of our eight fifth-grade classrooms draws from two school boundary areas … [one] which is upper class and [one] which is low. The other elementary that feeds into our school is largely middle class. I had nine parents who volunteered to come on our first field trip. About two-thirds of them took off work or rearranged their schedules to come, the other third were stay-at-home mothers. I believe that 3-4 students have reduced or free lunch.*

The Book Study

Chapter 1: Beginning the Study

Lynn began the project with a great deal of enthusiasm and some trepidation about both the equipment and the book study. Her school year started with a change in technology support personnel and consequently a change in some decisions about installation of the equipment. Lynn's classroom was located in a modular building and the school district was building a new elementary building that would be ready the following year, so instead of permanently mounting her interactive whiteboard and ceiling mounting the projector, it was decided to make them portable for the year. This caused a delay as new equipment was ordered. In addition, taking online courses was new to Lynn, so she experienced the expected initial difficulty getting used to Blackboard for her online professional development. In her first journal, Lynn wrote:

I have done my first set of discussion questions for the on-line book study and was a little intimidated. I couldn't remember if we had to be on-line the whole time to answer the first set of questions ... I read the chapter twice, once on Sunday and then again on Monday… I got an e-mail from [the Project Coordinator]... saying that only one person had answered the questions so far. So, I bit the bullet and went to the website. I answered the two questions. I would start to answer one of them and then delete. Then I would answer and then delete again. So, I finally went ahead and submitted my answers.

By the second week of the project, Lynn felt comfortable enough with the technology and lesson to invite in the external observer.

INSTRUCTIONAL STRATEGY 1: SIMILARITIES AND DIFFERENCE

Unit Topic: Language Arts – Classifying
Technology Used: Interactive whiteboard, document camera, wireless response system

Lynn developed a lesson on the skill of classification using the interactive whiteboard, document camera, and wireless response system. The goal of the lesson was to introduce students to classification of similar items, as well as naming categories.

Observation #1:

Twenty-five students were seated in desks clustered into groups of three around the classroom. The students had taken tests all morning, then had recess and a snack immediately before the lesson. The day was an early release day and the students were looking forward to intramurals right after the lesson.

Lynn began the lesson by asking students what the term 'classification' meant. The students responded with a variety of ideas. Then, Lynn wrote the word 'group' on the interactive whiteboard and recorded the students' responses.

Next, Lynn gave the students a verbal list of words and asked them to give the items a "big name." After the students responded satisfactorily, she wrote the word 'ball" on the interactive whiteboard and explained that they were going to look at things that were the same and different about a term (creative thinking). She then added the word 'donut' and asked students how the words "go together." The students suggested a variety of ways. She then added several other words on the interactive whiteboard and asked students to individually write the ways the words might go together on paper. She moved around the room assisting and encouraging students.

After the students had written down ideas she led a discussion of their ideas and moved the words on the interactive whiteboard into the groups suggested by the students. This process was duplicated with a list of counties and states. This time students went to the interactive whiteboard and moved the names around into various groups. The students were motivated by getting to move words around on the interactive whiteboard. The process was duplicated for a third time. But this time the students grouped the words on the interactive whiteboard, then asked other students to guess what label they had given their grouping. The game was very motivating to students.

Finally, students were instructed to take out their wireless response system clickers and answer a series of multiple-choice questions about classifying to check for understanding. The students were excited about using the system and most had the correct answers. It was apparent that the wireless response system was a novelty for students.

Lynn analyzed her lesson:

I think that the lesson went well and that the students have a clearer understanding of what it is to classify or group things that go together in some way. I started off by brainstorming with the students the word classification. I was able to write their thoughts up on the board. I used examples of giving the students the items and having them come up with the classification or category, and also giving them the category and having them name things that went with the classification. The students were really involved with the lesson and the technology. I feel the technology enhanced the lesson. I was able to add items to the lists, and that changed the classifying.

When we got to the part of the lesson with the response systems, I think the technology took away from the lesson. It took so long to get through the material; I was doing crowd control rather than checking on student understanding. I will definitely have to do more training on its use, and get the kids to use it correctly. I have a few students who kept pushing their buttons because they didn't think that their answer had registered, and I had several who just liked to see their light flash for their number.

In using the wireless response system to evaluate the lesson:

- 89% of the students in Lynn's class voted that they absolutely or mostly understood the lesson ideas;
- 89% indicated that the instructional strategy absolutely or mostly helped them understand the ideas;
- 85% thought the technology absolutely or mostly helped them understand the lesson ideas; and
- 52% absolutely or mostly liked the way they learned the lesson.

INSTRUCTIONAL STRATEGY 2: SUMMARIZING AND NOTE-TAKING

Unit Topic: General Skill – Summarizing
Technology Used: Interactive whiteboard, document camera

As she began thinking about how to use the second instructional strategy, *Summarizing and Note-taking*, Lynn wrote:

I have just finished reading a new chapter in Marzano's book on summarizing and note taking. Wow! These two concepts are so important but seem to be difficult for students to learn, and for me to teach. The book breaks these down and gives examples of formats and frames that can be used when teaching these two skills. I think that summarizing is difficult for fifth graders because it takes them to a new level- one of synthesis and analysis.

For this lesson, Lynn decided to teach an introductory lesson on summarizing as a skill. The lesson goal was that students would learn the rule-based strategy of summarizing and be able to summarize in one or two sentences. Also, students would be able to group summaries based on similarities and share with classmates.

Lynn introduced the concept of summarizing and wrote student ideas of what it meant on the interactive whiteboard. Then, she introduced the rule-based strategy and supervised the students as they moved words, deleted ideas, or highlighted passages on the interactive whiteboard. Finally, students worked through examples individually and shared them using the document camera.

Students evaluated the lesson using the wireless response system.

- 100% of Lynn's students indicated that they absolutely or mostly understood the ideas in the lesson;
- 96% said that the activity and the technology used in the lesson absolutely or mostly helped them understand the lesson ideas; and,
- 96% said they absolutely or mostly liked the way they learned the lesson.

Lynn thought the lesson went well and particularly noted the value of the wireless response system. She wrote, "The lesson went well, and things were better when we used the response system to get their opinion on the lesson and use of technology."

INSTRUCTIONAL STRATEGY 3:
REINFORCING EFFORT AND PROVIDING RECOGNITION

Unit Topic: Spelling Practice
Technology Used: Interactive whiteboard, document camera

For the instructional strategy *Reinforcing Effort and Providing Recognition,* Lynn again decided to teach the skill directly. In her journal, she emphasized the importance of student effort. She wrote,

> *This chapter was very interesting to read. It is important to let your students know that a belief in effort ultimately pays off in terms of enhanced achievement. It's the notion that if you believe that you have ability you can tackle anything. The book points out two generalizations about effort: Not all students know this, and so it is important to let them know that the effort they put into a task has a direct effect on their success related to a task; and students can learn to change their beliefs to an emphasis on effort. Since students might not be aware of the correlation between effort and achievement, teachers need to make sure that they teach it directly and that they might share personal examples. This concept seems so simple, and one I plan on pointing out through a quick lesson this week. Some students may also need to see the connection between effort and achievement.*

In preparation for teaching the lesson, Lynn retrieved a copy of the story *Little Engine that Could* from the Internet. She described her experimental lesson below:

> *I had the students take a quick survey. I asked if they felt that their effort has a positive effect on their achievement. I also asked if they keep trying an activity if they think they will get better at it; could they think of a story or time that they kept trying at something if it was hard and then they succeeded; and, I asked them to tell about a time they or someone else kept trying and then succeeded. About half of the students could not think of a story to write down. I shared the story [The Little Engine that Could] with them using the projection unit on the [interactive whiteboard]. After I shared the story, I had them tell me what they thought the story was about. I wrote down what they brainstormed. It was great. Then I shared two personal stories with the kids. One dealt with sports and the other was academic. After sharing, we went back to the [interactive whiteboard] and added to it. I had the kids vote on the response system about the lesson I had presented.*
>
> *As an assignment, they were to go home and ask their parents to share a story or talk about a time their effort paid off in success. I wanted the kids to be able to personalize a story. They needed to have a parent signature that they had shared. I gave them two days. We shared the stories as a class. It was great hearing the personal stories of all of the students. After we all had shared, I went back to the [interactive whiteboard] and we added a few more ideas - like after they learned how to do something they added to their knowledge. (An example given in class was bike riding, and now they are able to do wheelies). Students were then given the same survey to fill out and they were all able to write about effort.*

In her second journal entry, Lynn analyzed the lesson:

> *The next step when we come back after the winter break will be to ... keep track of ... effort and success using one or two of the rubrics on effort and achievement. So, the lesson will continue ... I think that the kids now have a personal story that they could share about themselves or a family member. I think that the strategy of effort was taught more deliberately than I did before. The students ... now know how they need to keep trying, and have some strategies of how to do that.*

Student evaluation of the lesson indicated that:

- 100% absolutely or mostly understood the key lesson ideas;
- 96% believed the activities they used absolutely or mostly helped them understand the ideas;
- 96% believed the technology absolutely or mostly helped them understand the lesson ideas; and
- 100% absolutely or mostly liked how they learned the lesson.

INSTRUCTIONAL STRATEGY 4: HOMEWORK AND PRACTICE

Unit Topic: Mathematics – Charting Accuracy and Speed
Technology Used: Interactive whiteboard, document camera

The fourth instructional strategy, Homework and Practice, reminded Lynn of information she knew, but had not thought of for a while. She wrote:

> *The book shows a graph or "learning curve." I was reminded that it is not until students have practiced upwards of about 24 times that they reach 80% competency. Learning new content needs to be spread out over time, and it is only after a great deal of practice that students can perform a skill with speed and accuracy. When students are given an assignment to make then faster and more accurate we might want to have the students chart their speed and accuracy. I know that sometimes I have to make my own worksheets and do not rely on the ones given with the math text because they get progressively harder. If I want my students to get faster and more accurate, the problems need to be similar.*

For the experimental lesson, Lynn chose a lesson on charting and accuracy. The goal of her lesson was to teach students how to monitor their practice in math. She wanted her students to learn how to monitor their speed and accuracy in math, and to see a correlation between practice and their performance. She used the interactive whiteboard and the document camera to facilitate the lesson.

First, Lynn led a discussion with students about the time it takes to learn a new skill and recorded their responses on the interactive whiteboard. Then, she used the document camera to share the Learning Line graph in the Marzano text and to explain focused practice. Finally, she used the document camera to demonstrate how to practice for speed and accuracy and how to record progress. To practice monitoring their own speed and accuracy and recording it on a graph, students completed a worksheet and recorded their results.

Lynn described student responses in this way:

> *I shared the graph in Figure 5.5 from the book with the kids, and talked about how when we are learning a new skill and trying to master it, it takes about 25 times for us to reach 80% accuracy. (We had just finished graphing, so I think they understood.) We also talked about practicing over time. The kids had a good discussion on something that they had learned and how they had to practice. I then brought up that after they had learned or mastered a skill that they then needed to work on speed and accuracy. I found a paper that had multiplication problems on it that were all similar (with carrying). We practiced and I modeled how to keep track of progress. When we practiced doing the problems and timing how many they could get done, most of the students were excited because their scores had gone up. I plan on practicing several times in the classroom and modeling again how to keep track.*

Student evaluation of the lesson indicated that:

- 92% absolutely or mostly understood the lesson ideas;
- 95% believed the instructional strategies used absolutely or mostly helped them understand the ideas;
- 95% thought the technology absolutely or mostly helped them understand the lesson ideas; and
- 95% absolutely or mostly liked how they learned the lesson.

INSTRUCTIONAL STRATEGY 5: NONLINGUISTIC REPRESENTATIONS

Unit Topic: Science – Learning the scientific method
Technology Used: Interactive whiteboard, document camera, wireless response system

The goal Lynn had for students using the fifth strategy, *Nonlinguistic Representations*, was for students to know the

vocabulary of the scientific method and the order in which to address the steps of scientific inquiry. Lynn was familiar with and positive about using nonlinguistic representations to teach and cement learning. She invited a student teacher in to begin the lesson on the scientific method by teaching the students a dance for it. As the student teacher and students danced, Lynn wrote the steps followed in the scientific method on the interactive whiteboard. She described the lesson:

> *Students were led in a kind of brainstorming where we thought back to an investigation that we had done previously in class (lab on diffusion and one on dissolve) and as they came up with the steps that we did, we named it and talked about what the word meant. So for example, Question: we talked about how we had a question that we wanted answered. Then Hypothesis: First this happens and then this happens – what we think is going to happen, etc. When we were done, the scientific method was listed in order on the [interactive whiteboard]. Question- Hypothesis-Materials-Procedures-Observation-Data Analysis-Conclusion-Question…*
>
> *We went through the list and gave actions for each of the steps in the method. What are we doing when we are observing? We held our hands above our eyes and scanned the horizon. Materials is gathering and grabbing what we need, and data analysis is pointing and looking at each and then coming up with a great idea. Music was added and we danced to the tune of "Mad Science" on a CD. As the kids did each motion they were asked what comes next, and they could look at the board if needed, but most of them remembered the motions. Then we repeated the song. Repetition is important to the scientific method.*

Student evaluation of the lesson indicated that:

- 100% of the students said they absolutely or mostly understood the lesson ideas;
- 100% believed the instructional strategy used absolutely or mostly helped them understand the ideas;
- 96% believed the technology absolutely or mostly helped them understand the lesson ideas; and
- 96% absolutely or mostly liked how they learned the lesson.

INSTRUCTIONAL STRATEGY 6: COOPERATIVE LEARNING

Unit Topic: Social Studies – American Colonies
Technology Used: Interactive whiteboard, document camera, wireless response system

Chapter 7, *Cooperative Learning*, was the sixth instructional strategy cited in the book, *Classroom Instruction That Works*. Lynn was obviously familiar with much of the research and many cooperative learning techniques, and used two types of groups often – informal groups and formal groups. She had not used base groups. She wrote:

> *I know that my students need more opportunities to practice working in cooperative groups. I am hoping that since this chapter points out the importance of cooperative learning that I will take the time to plan it into the lessons I am teaching. I use a lot of heads together in the informal way. I usually use in formal grouping for projects in science with experiments. I need to look at my lessons for more opportunities to use this strategy.*

She planned to use formal cooperative groups for a social studies lesson on the American colonies. Her goal was that students would know information about the colonies and differences between them in terms of geography, climate, jobs, civic participation, etc.

The external observer visited the classroom during part of the lesson. Students in the same 5th grade class that was observed in November were seated at individual desks now arranged in pods of four. The interactive whiteboard was freestanding in the front of the classroom beside a document camera and laptop computer located on the teacher's desk. The interactive whiteboard, document camera, projector, laptop computer, classroom audio system, and student books were used during the lesson.

In the portion of the lesson observed, Lynn used the cooperative learning techniques and strategies of: assigning roles, one set of materials per group, checking for understanding of all group members, 6-inch voices, and pair share. She used an interactive whiteboard, document camera, laptop computer, projector, and classroom audio system to teach the lesson. Her students were enthusiastic and engaged in the lesson, and worked productively in their groups.

Observation #2:

Lynn began the class by telling the students that they would be creating billboards as part of their assignment for the lesson, and that they would then give presentations to try and convince others to come to their colony. The class would vote on the colony they would most like to visit. Lynn displayed the word **BILLBOARD** on the interactive whiteboard and asked students (one question at a time) what a billboard is, what its purpose is and where they have seen one. The students eagerly volunteered a variety of responses. She then showed a series of digital photos of billboards found around their community on the interactive whiteboard and asked students to critically analyze what the billboards look like – words, layout, graphics, etc. The students recognized the local billboards and were interested and engaged in the analyses. As the students noted characteristics, Lynn used colored markers to highlight the categories of their observations.

Lynn went back to each billboard photo and asked students to identify what "struck them" about the billboard. She used a pair-share strategy in which pairs of students put their heads together and had a short discussion before responding. The students noted several key characteristics of billboards. Following the discussion, Lynn summarized the students' observations by providing three categories of characteristics of billboards and defining the vocabulary terms, such as logo, layout, and graphics.

Lynn assigned groups of four students (table groups noted above) and handed out one packet of information to each group. She used the document camera to talk students through the information and procedure in the packet and used the pair-share strategy to talk students through the lesson vocabulary. The teacher and students read through the introduction to the packet together and she assigned each group a colony. Then, she described packet roles - historian, advertiser, graphic artist, salesperson – and assigned one to each student by their number in the group (all "ones" are the historians, etc.) and told students they had three minutes to discuss the roles and switch if they wanted. Students were reluctant to take the role of historian, but finally all agreed on a role.

Next, students were told to learn about their colony by reading the information in their book and completing the chart of reading notes provided. The historian was to check each student's understanding of the information about his or her colony. They were reminded that they were in a competition so they should use their "6-inch voices" so other groups could not hear their discussions. Students proceeded quickly through the notes so they could get to the creation of the billboard.

When most groups were finished with their reading notes, Lynn gave a sample presentation and showed a billboard on a colony so students could conceptualize what their billboards and presentations might look like. She moved from group to group, giving assistance as student's worked through their packets. They seemed to be having difficulty with "catchy slogans." so she asked students to share some sample slogans and then told groups to go back and revise or redevelop ones for their colony.

In her assessment of the lesson, Lynn wrote:

I had planned for the groups to share using the document camera, but they asked if they could have larger paper for their billboards on the first day. They shared by having someone in the group help hold up the billboard as the salesperson presented why settlers should move to their colony.

I think when I do this lesson next year that I will separate the lesson into more parts and definitely

have time limits by having them do the filling in of the graphic organizer and definitions on one day. Then on the next day, I will present the specifics for what needs to be included in their billboard and presentation, and let them work in their groups on that part ...The groups will do their presenting on a third day.

The students actually were quite loud on that first day and had to be asked several times to bring down their voices. But, most times when I was checking on the groups they were working. They were very excited about the project and have asked each day if they get to do something like that again. The students also graded themselves and their groups by using a circle and shading in a portion for each of their members (including themselves) and how they contributed to the group. Most students were very thoughtful in this process and I had them use their test folders to keep their answers private.

When the students evaluated the lesson,

- 100% believed they absolutely or mostly learned the key ideas in the lesson;
- 96% thought the instructional strategy absolutely or mostly helped them learn the lesson ideas;
- 92% thought the technology absolutely or mostly helped them understand the lesson ideas; and,
- 93% absolutely or mostly liked the way they learned the lesson.

INSTRUCTIONAL STRATEGY 7: SETTING OBJECTIVES AND PROVIDING FEEDBACK

Unit Topic: Social Studies – Goal Setting
Technology Used: Interactive whiteboard

As a former Special Education teacher, Lynn was surprised by some of the research finding reported by Marzano, et.al. in Chapter 8: *Setting Objectives and Providing Feedback.* She wrote:

Yikes! Lots to think about! The first concept is that if a teacher establishes a goal, it narrows what the student focuses on. When you first look at it, it first appears like a good thing. Research shows that this actually has a negative effect on outcomes other than those specified. Students just learn the narrow focus that you have given them. A student's understanding might actually be less than if a specific goal were not set … Goals stated in behavioral objective format (as per our old Special Education days and IEP's) do not produce effects as high. I can remember writing the IEP's and making sure that I was very specific: performance-conditions-criterion. I think that this is showing the constructivist view and having the "overarching" question guide you.

Lynn also responded to the information on *providing feedback.*

Feedback needs to be corrective in nature. This means we need to provide students with an explanation of what they are doing that is correct and what they are doing that is not correct-accurate vs. inaccurate. The next concept about feedback is that it needs to be timely. Yikes!… I guess I can set a few goals for myself. I will try to provide more written comments on students' papers as to what they are doing well and what they can improve - getting that feedback to the students in a timely manner.

Again, Lynn planned a Social Studies lesson to test this instructional strategy. In preparation for a research unit on States in the U.S., Lynn wanted students to be able to identify the five strands of social studies and to set goals and objectives for the information they would like to learn about their state within each strand. The external observer was invited in to observe an early lesson in this unit. The interactive whiteboard and a packet of teacher-created worksheets were used in the lesson.

Observation #3:

Lynn began the class by handing out the worksheet packets and reminding students that they would each be writing a state report using the five strands of social studies as guidelines so they needed to take notes from the lecture. Each worksheet in the packet had the name and definition of one of the five strands followed by three phrases:

1) I want to know…
2) I want to know more about…
3) I know that… but I want to know….

To start the lecture, Lynn popped up the first sheet of the packet (the geography strand), and its definition on the interactive whiteboard, followed by selected geography concepts and topics. As she explained the concepts, she asked students related questions about "what they know" from their past learning to provide illustrations. Students took notes and participated as questions were asked.

Next, Lynn brought up the slide entitled, "What I want to know about…" and asked students to tell their neighbor quietly what they want to know about their selected state related to the geography concepts. Lynn used examples from the state of Washington for each concept to provide students with ideas about what kind of geography knowledge they might want to know about their state. She proceeded through the other five strands – economics, culture, history, and government – using the same process. The students talked quietly with their neighbors about their topic, then filled out their worksheet report forms.

Finally, when they had gone through the five strands, Lynn asked the students to recite the names of the five social studies strands to their partners and told them they had time to work on their reports, which would be an ABC book format. The students were enthusiastic about beginning their reports.

The lesson continued for a week. The next afternoon the students had Tech lab and they went to the Internet to find answers for teacher-provided questions, and to find answers to the goal each had set. Lynn wrote:

> *Some of the students told me that they had found their answer, and others said that they still needed to look on another site, or in their state books. Each student has checked out a book from the library on his or her individual state. We only went to one website and will be looking at several others as "Favorites." They will also use their state books to help them with their research … They are all so excited about their states and are eager to share information that they have found with me!*

In the student evaluation of the lesson:

- 95% thought they absolutely or mostly learned the lesson ideas;
- 95% thought the instructional strategy absolutely or mostly helped them learn the ideas;
- 100% thought the technology absolutely or mostly helped them learn the lesson ideas; and
- 91% absolutely or mostly liked the way they learned the lesson.

INSTRUCTIONAL STRATEGY 8: GENERATING AND TESTING HYPOTHESES

Unit Topic: Science – Swingers (Problem-solving building a pendulum)
Technology Used: interactive whiteboard, document camera

Lynn easily related what she had been doing in the Foss science kits to the instructional strategy in Chapter 9, *Generating and Testing Hypotheses*. And her observations of student learning were confirmed by what she read. In reacting to one area of the text, Lynn wrote:

> *I just finished reading a chapter in Marzano's book on generating and testing hypotheses ... this is at the application level for our students. One of the generalizations made in the book is that hypothesis generation and testing can be approached in the inductive and deductive way with the effect size for deductive techniques larger that inductive ... The second generalization is to have the students clearly explain their hypothesis and their conclusions. This needs to be done in writing, which helps the students to deepen their understanding. I see this all the time. When students have to teach another student or write down their thoughts, they cement it in their heads, especially if they give an example.*

Lynn selected a science unit on Pendulums to try this instructional strategy with her technology. She wanted her students to know what a 'variable' was within a controlled experiment, and she wanted them to be able to communicate their predictions and findings in writing.

To begin her unit entitled "Swingers", she used the interactive whiteboard to introduce vocabulary. Then, she talked students through construction of a pendulum under the document camera so all students could clearly see what she was doing. She used a conversation frame to illustrate the questions and responses they might consider as they constructed their own pendulums. Students worked in pairs, experimenting with longer and shorter strings, heavier or lighter pendula, etc.

Lynn portrayed the students' experimentation:

> *Working in their groups of two, the students changed one variable at a time and made a prediction. (We were trying to find out how to make the swingers go faster in the given time frame.) They tried changing the weight by adding another penny, and then made their strings shorter and counted the number of swings. The experiment really helped the students learn what a variable is, and how to change only one variable at a time. I put up a graph on the board, and when the students discovered that it was the length of the string, we put up the strings, and the number of swings on the graph. It made a great visual, with the longer strings showing less swings.*

The big difference in the experimental lesson was that she used a rubric to assist students in understanding the criteria of excellence. She wrote:

> *I ended up using bullets like they do in the Science WASL [Washington Assessment of Student Learning]. As a class, we discussed that each of the bullets needed to be addressed ... like a checklist of sorts. Students were asked to use the vocabulary that was introduced as they wrote about their findings. So, in their conclusions, they had to use the vocabulary correctly ... I think that the lesson really helped the students to understand a variable and the importance of only changing one at a time in an experiment.*

The stress of the end of the school year showed up in her journal entry. "Phew," she wrote, "only one more chapter in the book to write a lesson plan for! It is a chapter on cues, questions, and advance organizers."

Student evaluations of the lesson indicated that:

- 100% believed they absolutely or mostly learned the key ideas in the lesson;
- 100% thought the instructional strategy absolutely or mostly helped them learn the ideas;
- 96% believed the technology absolutely or mostly helped them learn the lesson ideas; and
- 88% absolutely or mostly liked the way they learned the lesson.

INSTRUCTIONAL STRATEGY 9:
CUES, QUESTIONS AND ADVANCE ORGANIZERS

Unit Topic: Interdisciplinary – Skimming as a form of advance organizer
Technology Used: Interactive whiteboard, document camera

The final instructional strategy, *Cues, Questions, and Advance Organizers*, was another "reminder" chapter for Lynn. "This chapter," she wrote, "pulled together a lot of what we already do as teachers, but again it brought it to the forefront so that I am consciously thinking about what I do every day."
For the lesson, she selected a technique taken from "History Alive" called "5-5-5". The goal of the lesson was that students would learn the 5-5-5 process. Students were assigned to skim a chapter in their social studies textbook and required to write 5 words, use 5 colors, and draw 5 pictures on paper that helped them relate to what they read.

Lynn described the lesson:

> *.... I used a combination of the [interactive whiteboard] and the document camera to teach the lesson. I started off by writing 5-5-5 in black on the Smart Board and explained to the class that we would be using a skimming technique called 5-5-5. I also explained that by skimming, they would know more about the chapter when they read it. Then I wrote the word "word" using a different color under the first 5, the word "color" in another color under the second, and "picture" using a different color under the last.*
>
> *I had the Social Studies textbook open under the document camera and explained that I would be doing a 5-5-5 on lesson 3 of the chapter to show them. I also explained that they would be doing their own 5-5-5 and would get a grade for it. We went over again how they would earn +15 points. They were told that words needed to be spelled correctly. I talked out loud, as I skimmed telling the class why I picked that word and why it might be important. I kept switching between the book and the Smart Board. I am not sure if it would have been better to just use to the document camera. After recess the students shared their 5-5-5's with the entire class and explained their choice of words and pictures from the lesson in the book.*

Lynn thought the lesson went well. "... All but two students got all of their points," she wrote. "The next day, when we read the chapter, the students really keyed in on the major concepts, and I felt [they] did better on their continued work from that lesson."

Student evaluation of the lesson for *Cues, Questions and Advance Organizers* indicated that:

- 100% believed they had absolutely or mostly learned the lesson ideas and, also, thought the instructional strategy had absolutely or mostly helped them learn the ideas;
- 96% thought the technology absolutely or mostly helped them learn the ideas; and
- 96% absolutely or mostly liked the way they learned the lesson.

CHAPTERS ELEVEN AND TWELVE: COMPLETING THE STUDY

Lynn's response to the last two chapters was to view them as important in summarizing and tying together the learning. One idea in Chapter 11 that she related strongly to was the idea of multiple exposures. She wrote:

> *The big "aha" was that students should have systematic, multiple exposures to details, and the time between exposures should not be more than about two days. A sequence for teaching could look something like this: teachers and students read lesson aloud and discuss it, in two days watch a film, another two days do another reading on the topic. Dramatization either by observing a dramatic enactment of the details or if students are involved in a dramatic enactment of the details has the strongest effects both immediately after instruction and one year later. I fell affirmed in using "History Alive" materials, which have been a great supplement to fifth grade curriculum this year.*

Finally, Lynn wrote, "I am hoping that next year, we will continue to share ideas and strategies that work with our students. I think, now, I have a tool belt with the right tools and ... I just need to use them and apply them with my students."

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