METHODS USED IN CREATING A
STUDENT-CENTERED HIGH SCHOOL CHEMISTRY LESSON

A Thesis in
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by
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The aim of this research is to analyze the teaching methods used by a high school chemistry teacher to create a student-centered lesson. Student-centered instruction is defined as that in which students are responsible for asking scientific questions, responding to one another, and evaluating their classmates’ responses. Videotapes of the classroom instruction were analyzed using StudioCode. Two major claims were made as a result of analyzing this data. First, in many instances the teacher’s lesson was student-centered. Specifically, the students frequently asked scientific questions, responded to one another, and evaluated each other’s responses. The most prominent and effective of the teacher’s techniques was reminding the students to discuss and evaluate their classmates’ proposed ideas. However, instances occurred in which the class moved away from a student-centered learning environment. In these instances, the class fell back into the traditional I-R-E classroom discourse model, where the teacher asked questions and then evaluated student responses. Certain moves designed to encourage student-centeredness, such as the teacher’s abruptly walking away from student conversations, confused and frustrated the students and moved the class away from a student-centered learning environment.
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Chapter 1

INTRODUCTION

A major change in thinking about education occurred throughout the twentieth century as theorists such as John Dewey, Jean Piaget, and Lev Vygotsky suggested that individuals can and do construct their own learning. Their collective works shifted conversations amongst educators from how a teacher can deliver knowledge to how a student can shape his own learning. With this new discourse came a change in instructional practices as teachers were encouraged to actively involve students with content material by allowing them to manipulate materials and interact socially in the classroom with each other.

This change in thinking affected science education, most notably in the form of inquiry, which is included as a prominent feature of the National Research Council’s *National Science Education Standards* (1996). Classroom inquiry is described as a process in which students (rather than teachers) are responsible for considering scientific questions, analyzing and using evidence to make explanations, and communicating and justifying their explanations (NRC, 2000). Classroom instruction that allows students to actively take part in scientific processes like these is often called “student-centered”.

The aim of this research is to analyze the teaching methods of a high school chemistry teacher, who is trying to create a student-centered learning environment. Student-centered instruction will be defined as that through which students are more responsible for asking scientific questions, responding to one another’s ideas, and evaluating their classmates’ responses (where they take on the roles of initiator and evaluator, which are typically performed by the teacher). On the other hand, instruction that is primarily teacher-centered is when the teacher initiates an idea, the student responds, and the teacher evaluates the student’s response (the
traditional I-R-E model). The questions behind this study are outlined below.

**Research Questions**

- What discourse moves, both verbal and non-verbal, did Ms. Hunter use in an attempt to move her class toward a more student-centered learning environment?

- Which of her methods moved the class away from a student-centered learning environment?
Chapter 2

LITERATURE REVIEW

Three areas of research will be investigated in order to form a foundation for this study. First, since the main focus of this study is the creation of a student-centered classroom, the positive effects of student-centered classrooms will be outlined. Next, since student-centered instruction was defined above as that through which students are more responsible for initiating discussions/questions (I), responding to one another (R), and evaluating their classmates’ responses (E), research related to the I-R-E discourse model will be examined. Finally, since Ms. Hunter often uses nonverbal or verbal cues to move her class toward a student-centered learning environment, related research devoted to nonverbal and verbal communication in classrooms will be highlighted.

Several research studies emphasize the positive effects of a student-centered classroom. Hsu (2008) investigated two groups of second-year high school students studying seasonal change in terms of planetary motion. One group studied the topic through a more teacher-guided approach. The other group was engaged with the same material through a student-centered online course, where students analyzed animations, generated explanations, and posted scientific explanations of real-world situations in an online forum. At the end of the instruction, Hsu found that the student-centered approach was more effective in altering students’ misconceptions of seasonal change. She postulated that these students more easily grasped proper scientific explanations because they were able to test their own hypotheses through online exploration and modeling.

Taraban (2007) conducted a similar study with approximately four hundred high school biology students. He found that students who were exposed to “active-learning labs”, where
traditional teaching methods (such as lecturing, individual tasks, and worksheets) were replaced with increased collaborative and lab-based activities, gained significantly more content knowledge and science process skills than those who had been exposed to traditional instruction.

In addition, Hoyo and Allen (2005) found that students’ attitudes toward learning can be positively effected by the implementation of student-centered teaching methods. In this study, two sections of the same general chemistry course at North Carolina State University were compared. The first was exposed to traditional chemistry lectures, while the other was part of a novel course called “Student-centered Activities for Large Enrollment Undergraduate Programs” (SCALE-UP). Students in the SCALE-UP course engaged in hands-on activities, cooperative learning, real-world scenarios, and technological applications. Hoyo and Allen used student surveys to show that the SCALE-UP students experienced positive changes in their attitudes toward learning more so than students in the traditional lecture section.

These investigations reveal the positive effects student-centered lessons can have on student achievement and student attitudes toward learning. However, they do not consider (in any great detail) the techniques by which teachers establish student-centered lessons - the focus of this inquiry. Moreover, these studies were conducted in science classrooms at the high school and college levels, but none was conducted in a high school chemistry classroom.

Although student-centered instruction is shown to have a positive effect on learning, classroom instruction is often still authoritative, in which the teacher controls the instruction and attempts to transmits content knowledge to the students. Mehan (1979) suggests this type of instruction is often achieved through the I-R-E (Initiation-Response-Evaluation) model. In this model, the teacher initiates the exchange by asking a student a question, the student responds, and the teacher evaluates this response.

Various versions of this model have been published, including the I-R-P-R-P model (P stands for prompt) (Scott and Mortimer, 2006) and the I-R-F-R-F model (F is feedback) (Wells,
Lemke (1990) describes the I-R-E pattern as Triadic Dialogue. He acknowledges the comfort Triadic Dialogue creates for teachers since they can steer their lessons as they see fit through this model. However, he states that through the I-R-E, “students don’t get much practice at talking science” and that it “tends to keep the thematics of the science content implicit and effectively hidden from many students” (p. 24).

In this study, Ms. Hunter strays from the I-R-E model by using nonverbal and verbal cues to encourage her students to adopt the roles of initiator and evaluator. As such, it is important to briefly investigate related research studies that focus on the use and effect of nonverbal and verbal communication. Gullberg’s (2010) investigation of second-language acquisition underscored the importance of a combined analysis of speech and gesture. Likewise, this study is part of a body of research studies that analyze the unified use and effect of nonverbal and verbal communication – rather than treating the two forms of communication as separate and distinct entities.

Woolfolk investigated four teachers, each using a different combination of nonverbal and verbal behavior when evaluating students’ ideas: (1) verbally and nonverbally positive, (2) verbally positive and nonverbally negative, (3) verbally negative and nonverbally positive, or (4) verbally and nonverbally negative (1978). The nonverbal teacher behaviors analyzed were facial pleasantness (smile), affirmative head nod, and tone of voice.

Woolfolk found that the teacher’s negative nonverbal behavior accompanied with positive verbal behavior led to significantly greater performance during the lesson. She postulated that this combination seemed to portray the teacher as “firm but fair” (p. 92). She argued that negative nonverbal behavior communicates seriousness and control, while positive verbal behavior is supportive. This study indicates that by modifying their verbal and nonverbal cues, teachers can affect student performance.

Similarly, Babad (1991) showed that students can perceive teachers’ opinions of them
using nonverbal and verbal cues. He exposed students in different age groups and teachers with varying experience levels to short video clips of teachers interacting with students for which they possessed high or low expectations. Babad found that these observers came away with a more positive impression of the students for whom the teacher had higher expectations. This study showed that students are able to detect teacher’s expectations of them (or others) based on the teacher’s nonverbal or verbal behavior.

These three areas of research: the consequences of student-centered classrooms, the I-R-E discourse model, and nonverbal and verbal cues, serve as groundwork for this study. In the following chapter, we will see Ms. Hunter use nonverbal and verbal cues to attempt to create a student-centered learning environment, in which students are responsible for all parts of the I-R-E model.
Chapter 3

CONTEXT

This inquiry is based on observations and analysis of video taped lessons from Heather Hunter’s 11th grade chemistry classroom at a fairly large high school in Pennsylvania, which enrolls approximately seven hundred students in grades 9-12. Approximately 96% of students at this school are Caucasian, and 19% are eligible for free or reduced lunch. Ms. Hunter was a second year teacher when this data was collected. She received teacher training at Penn State.

Three forty-five minute lessons conducted by Ms. Hunter on March 30, 2009, were utilized. The lessons were taught two-thirds of the way through the school year. The students had already learned to identify compounds by name, write chemical formulas, balance chemical equations, and identify types of reactions. Each lesson was designed by Ms. Hunter and covers the same content material – comparing mole and mass ratios – but is taught to a different class of students.

All three analyzed lessons consist of the same progression of events. First, Ms. Hunter split the class up into small groups of 3-4 students. She then introduced the students to the reaction between zinc and sulfur, which is used to create rocket fuel, and told them that they would be conducting this reaction in class. This reaction was selected because zinc and sulfur react in a 1:1 mole ratio (not a 1:1 mass ratio). She asked each group to logically determine how much sulfur should be reacted with 6.54 g of zinc. Once the groups determined how much sulfur to use in the reaction, they presented their ideas to their classmates. The class then used reasoning to determine which ideas were best and tested these ideas by mixing the requested amounts of materials and then igniting them.
Chapter 4

ANALYSIS

The collected data was analyzed using StudioCode®, which is specifically designed for the analysis of video. The videos were watched and the teacher’s moves were initially grouped into two categories: those that supported a student-centered learning environment (“supportive moves”) and those that did not support a student-centered learning environment (“hindering moves”). Teacher moves that caused students to propose, respond to, or evaluate ideas related to the zinc/sulfur problem were categorized as “supportive moves”. When the teacher prevented the students from proposing, responding to, or evaluating ideas or when she caused them to resist participating in these activities, her moves were categorized as “hindering moves”.

From here, these two categories were broken down and coded more specifically to describe the teacher’s discourse moves, both verbal and non-verbal. Table 4-1 shows the codes for each category. It also indicates the number of instances that occurred for each code (over the three lessons).

Table 4-1: Codes

<table>
<thead>
<tr>
<th>Supportive Moves</th>
<th>Instances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher advised students to generate ideas and provide feedback</td>
<td>2</td>
</tr>
<tr>
<td>Teacher reminded students to look at/talk to classmates as they presented</td>
<td>4</td>
</tr>
<tr>
<td>Teacher encouraged students to discuss/evaluate proposed ideas</td>
<td>21</td>
</tr>
<tr>
<td>Teacher demonstrated reluctance to provide feedback</td>
<td>8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hindering Moves</th>
<th>Instances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher nonverbally evaluated student ideas</td>
<td>4</td>
</tr>
<tr>
<td>Teacher walked away from student conversations</td>
<td>15</td>
</tr>
</tbody>
</table>
Chapter 5
DATA AND RESULTS

Two major claims can be made from analyzing this data. First, for the most part Ms. Hunter’s lesson was student-centered. In other words, the students frequently initiated, replied to, and evaluated each other’s ideas, while Ms. Hunter typically avoided proposing ideas or giving feedback. Certain moves made by Ms. Hunter were more conducive to a student-centered environment, such as encouraging students to talk to and look at their classmates as they presented their proposals and holding the students responsible for discussing and evaluating their classmates’ proposed ideas. However, a second claim related to the data is that instances occurred in which the class moved away from a student-centered learning environment. In these instances, Ms. Hunter and her students fell back into the traditional I-R-E classroom discourse model, where Ms. Hunter initiated and evaluated ideas and the students simply responded to her ideas. In addition, certain moves made by Ms. Hunter, such as abruptly walking away from student conversations, created tension between the teacher and her students and contributed to the movement of the class discourse away from a student-centered learning environment. These claims will be supported using quotations and photographs from the lessons.

Progress Made Toward a Student-Centered Learning Environment

Ms. Hunter and her students made progress in moving toward a student-centered learning environment. She accomplished this by frequently encouraging her students to initiate ideas and to respond to and evaluate their peers’ ideas. She held students responsible for roles typically practiced by the teacher (initiator and evaluator). Simultaneously, Ms. Hunter tried to avoid
giving away solutions to the zinc/sulfur problem or from providing the students with her own feedback or evaluation. Ms. Hunter generally utilized four methods in order to encourage her students to propose, respond to, and evaluate each other’s ideas and to avoid proposing her own ideas or providing evaluations. These methods were both verbal and nonverbal:

1. Before the lesson began, Ms. Hunter advised students that they were responsible for generating ideas and providing feedback.
2. Ms. Hunter reminded students to talk to and look at their classmates (rather than her) when proposing ideas to the class.
3. Once the students had shared their ideas with the class, she encouraged them to discuss and evaluate the proposed ideas with one another.
4. Ms. Hunter used hand gestures, such as pointing, crossing her arms, shrugging her shoulders, or raising her palms, to demonstrate her reluctance to provide feedback.

Before each lesson began, Ms. Hunter advised her students to generate and evaluate their own ideas – rather than relying on her assistance. For instance, at the beginning of one class she said, “Even though Mr. Carter [an observing teacher] and I know the answer, we’re not telling you anything – nothing. So when you’re talking, you want to talk to the people in your group. But, also, you can talk outside your group.” Likewise, in another class, she stated, “Although myself and Mr. Carter of course know how this reaction works, we forgot when we walked in the door. So we will not help you. You are talking to each other, and you can talk to each other in different groups, too.” In these examples, Ms. Hunter essentially informed her students that they were responsible for generating and evaluating ideas in this lesson and that she would not be the dominant contributor to the classroom discourse. Accordingly, most groups took charge of determining the proper ratio of zinc to sulfur without the help of their teacher. For instance one
group stated that they would use equal masses of zinc and sulfur “since zinc has a +2 charge and sulfur has a -2 charge.” Another student said that his group would use 3.21 grams of sulfur because 6.54 grams of zinc is 10% of the molar mass of zinc, and 3.21 grams of sulfur is 10% of the molar mass of sulfur.

Once the students had thought of ways to solve the zinc/sulfur problem, Ms. Hunter asked her students to propose these ideas to the class. While the students were presenting, Ms. Hunter encouraged them to talk to and look at their classmates (rather than to/at her). For instance, frame (a) of Figure 5-1 shows a student, Sharon, presenting her group’s idea for the zinc/sulfur reaction to the class. As she explains the idea, she looks directly at Ms. Hunter, who is sitting at the front of the classroom. Sharon’s back is turned to the majority of her classmates. During her explanation, Ms. Hunter points to the rest of the class and tells Sharon to “tell them – not me” in frame (b). Sharon then turns toward her classmates in frame (c) and finishes her explanation.

Figure 5-1: Teacher reminds student to look at classmates when presenting.

When another student, Mike, begins to present, Ms. Hunter similarly says, “Mike, don’t you even dare tell me your idea because I already know it. Tell them.” By encouraging the presenting students to look at and talk to their classmates, Ms. Hunter demonstrated that it was
the class’ responsibility to respond to and evaluate the proposals. In response to Ms. Hunter’s cues, most students did direct their presentations to the class rather than to her.

As the lesson progressed, Ms. Hunter’s students were responsible for discussing their proposals with one another. The teacher encouraged them to ask questions of one another and to provide feedback. For instance, when one student, Ashley, informed Ms. Hunter of her proposal for the zinc/sulfur reaction (to use a 1:1 ratio when determining the amounts of zinc and sulfur), Ms. Hunter encouraged her to tell her group members about her idea. After the students had discussed Ashley’s idea, the other group members were able to explain Ashley’s idea to the class. This seemed to indicate that the group had a productive conversation about Ashley’s proposal. In another instance, Ms. Hunter encouraged a student, Laura, to tell another group about her evaluation of their proposal. Laura walked over to the other group and said, “Your idea makes sense because sulfur is more reactive than zinc so you need less of it.”

A similar situation occurred with another student, Mandy, as the teacher encouraged her to talk with a student from a different group, Seth. As shown in Figure 5-2 (a), when Mandy asked Ms. Hunter a question about another group’s idea, Ms. Hunter said, “If you have a question, you can ask them [the other group]. Actually, Seth, we need you. We need you right here for a minute.” She simultaneously motioned to Seth with her right hand. Seth then walked over to Mandy and explained how he arrived at his solution using the periodic table (frame b). He said, “we’re using 6.54 grams of zinc, and on the periodic table, the mass of zinc is 65.4. The mass of sulfur is 32.1 so we want to use 3.21 grams.” Mandy replied, “Oh…. I understand.” In this instance, Ms. Hunter literally substituted Seth for herself. This is a nice example in which the teacher, who is traditionally responsible for explaining and evaluating student ideas, is replaced with a student.
In another situation, Mrs. Hunter encouraged a student, Tommy, to respond to and evaluate another group’s idea. She said, “Hey, Tommy, tell them that you think that about their idea.” This led to a large conversation between three groups about factors that must be considered when creating the perfect rocket reaction. One student suggested that reactivity needed to be considered. A student from another group said that you need less sulfur since it is “farther up and over” on the periodic table. Moreover, a student from a third group stated “sulfur is more reactive so you need less of it.” Once Ms. Hunter encouraged the students to talk to one another, they began initiating and responding to one another’s ideas.

Finally, as Ms. Hunter encouraged her students to initiate, respond to, and evaluate ideas, she simultaneously attempted to remove herself from the classroom discourse. On eight occasions, she used neutral nonverbal communication in order to avoid responding to or evaluating student ideas. She commonly used hand gestures, such as pointing, crossing her arms, shrugging her shoulders, or raising her palms, to demonstrate her reluctance to provide feedback. In frame (a) of Figure 5-3, a student, Melissa, is explaining to another group (not shown) how she incorporated reactivity into her proposal. She says, “Sulfur is more reactive so you need less
of it.” In frame (b), Ms. Hunter neutrally responds to this suggestion by shrugging her shoulders, raising her palms, and saying, “Just ideas.”

Figure 5-3: Teacher responds to student’s idea with neutral nonverbal and verbal communication.

Overall, Ms. Hunter was most effective in creating a student-centered learning environment when she encouraged the students to talk to and look at their classmates as they presented their proposals and when she held the students responsible for discussing and evaluating the proposed ideas. As described earlier, every time Ms. Hunter asked a student to look at his/her classmate while presenting, the student followed suit. By telling students to look at each other while presenting, the students got into the habit of expecting responses and feedback from their classmates – rather than their teacher. Moreover, by advising the students to talk to one another, they often had meaningful conversations with their peers both within and outside of their groups. During these conversations, the students often generated ideas or evaluated each other’s assertions.
Movement Away From a Student-Centered Learning Environment

Although Ms. Hunter made progress in moving her classroom toward a student-centered learning environment, there were several occasions in which her lessons reverted back to a traditional, teacher guided format. This happened in two manners. In some cases, Ms. Hunter unintentionally evaluated student ideas, rather than allowing the students to independently judge the validity of their peers’ proposals. In other words, she took on the traditional role of guiding the classroom discourse, rather than allowing the students to take control of their own learning. In other instances, she used moves that led to student discomfort and frustration, which dissuaded the students from proposing, responding to, or evaluating ideas.

Ms. Hunter primarily passed judgment on student ideas through nonverbal communication. These instances occurred when the teacher was talking to small groups of students. She occasionally nodded or smiled in response to a student idea, which seemed to indicate that the idea was correct. For instance, Ms. Hunter responded in this way when a student noticed that zinc and sulfur react in a 1:1 ratio, which could explain why 0.10 moles of sulfur are needed to react with 0.10 moles of zinc. When the student initiated this idea (which is correct), Ms. Hunter nodded her head, smiled, slowly backed away from the student, and told her to explain it to her group member (as shown in Figure 5.4). This response was significantly different from her normal reaction to student proposals, in which she either walked away abruptly or used neutral nonverbal communication, such as crossing her arms, shrugging her shoulders, or raising her palms, to avoid evaluating student ideas.
On the other hand, at times the students became so frustrated with Ms. Hunter’s attempts at creating a student-centered lesson, that they refused to initiate, respond to, or evaluate ideas. For instance, when the teacher suggested that a student, Lisa, talk to another student, who had a similar idea, Lisa responded by sarcastically saying, “Let’s have a conversation.” Lisa never talked to the other student.

In several instances, students utilized a combination of gestures, facial expressions, and lack of eye contact to demonstrate discomfort with Ms. Hunter’s student-centered lesson. For instance, in Figure 5-5, the student in blue, Tim, becomes uncomfortable when Ms. Hunter suggests that he ask another student a question. In frame (b), Tim avoids eye contact with Ms. Hunter by looking down at his desk, smiling, and laughing. He then says “no” when Ms. Hunter asks him to invite another student over to his desk. In another case, a student smirked as Ms. Hunter asked him to discuss his ideas with another group. Six other instances were found in which students laughed uncomfortably when Ms. Hunter asked them to initiate conversations or evaluate their peers’ ideas.
Figure 5-5: Student refuses to start a conversation with another classmate.

However, the class became the most uncomfortable, confused, and frustrated when Ms. Hunter abruptly walked away from conversations with students. This move was generally destructive and moved the class away from a student-centered learning environment. Although she did this in order to encourage students to evaluate each other’s ideas and avoid passing her own judgment on student ideas, Ms. Hunter ended up confusing the students. This is shown in frame (b) of Figure 5-6, where Ms. Hunter turns and walks away from Sara after she asks a chemistry content question.

Figure 5-6: Teacher walks away from conversation with Sara.
Although this action was intended to promote conversation between Sara and her group members and encourage the students to answer Sara’s question, this anticipated result did not occur. Instead, when Ms. Hunter left, Sara looked down at her paper and did not speak to her group members. Soon, the students were talking about something else and Sara’s question went unacknowledged. In other situations, the students’ confusion grew into frustration. After Ms. Hunter frequently walked away from one group of students and refused to give them answers, one student, Maggie, responded by saying, “Why do you have to be Switzerland?” In other words, she was frustrated with the teacher’s neutral responses to her group’s ideas. In another instance, a student angrily said, “and she just keeps walking away,” after Ms. Hunter left while his group was explaining an answer to her. In total, Ms. Hunter walked away from student conversations fifteen times during the course of the three lessons.

Confusion and frustration resulted from Ms. Hunter’s abruptly walking away from her students. This data shows that a successful student-centered lesson can not be created by simply taking the teacher out of the lesson. Instead, as shown earlier, the teacher must support and encourage the students in proposing, responding to, and evaluating ideas.

**Summary**

Ms. Hunter made significant progress in moving her classroom toward a student-centered learning environment. In many cases, she encouraged her students to initiate, respond to, and evaluate ideas by telling them to talk to one another, advising them to look at each other while presenting, and using neutral nonverbal communication to avoid evaluating student ideas. However, there were instances in which Ms. Hunter’s lessons reverted back to a teacher-centered format. In these situations, either Ms. Hunter inadvertently evaluated student ideas or the students generated resistance to her attempts at creating a student-centered lesson. Overall, Ms.
Hunter was most effective in encouraging students to take control of their learning when she advised them to talk to and look at their classmates as they presented their proposals and when she held the students responsible for discussing and evaluating the proposed ideas. On the other hand, when Ms. Hunter abruptly walked away from conversations with students, they became confused and frustrated, and generally did not take responsibility for their own learning.
Chapter 6

IMPLICATIONS

First, this research has implications for practicing teachers. The results of this study indicate that creating a student-centered learning environment is difficult. Although the importance of breaking free of the traditional I-R-E pattern and incorporating inquiry is stressed in the literature (NRC, 2000), it is not always easy to integrate these ideas into a classroom. As we saw in Ms. Hunter’s case, simply removing the teacher from student conversations did not guarantee that meaningful communication would occur between students. Instead, it was important that she continually support the students in asking questions, responding to one another, and evaluating their classmates’ proposals.

Moreover, this study can be compared to Woolfolk’s work with nonverbal and verbal behavior (1978). Woolfolk found that by modifying their verbal and nonverbal cues, teachers can affect student performance. Her assertion fits nicely with the results of this inquiry. Ms. Hunter used both nonverbal and verbal cues in her classroom in order to encourage her students to initiate, respond to, and evaluate ideas. For instance, as discussed above, when a student, Mandy, was confused about another group’s idea, Ms. Hunter verbally and nonverbally (through a hand gesture) encouraged Mandy to consult her classmate, Seth. Ms. Hunter’s cues led to a productive conversation between Mandy and Seth about how to use the periodic table to determine the proper ratio of zinc to sulfur. This example demonstrates that teachers can affect student performance using nonverbal and verbal cues.

Additionally, it is interesting to compare the results of this study to those of Hoyo and Allen (2005). Hoyo and Allen found that students’ attitudes toward learning are positively affected by student-centered lessons. However, this study shows that the manner
in which a student-centered lesson is created can either positively or negatively impact student attitudes toward learning. As discussed earlier, Ms. Hunter’s students generally responded positively when they were asked to look at their classmates when presenting their proposals and when they were held responsible for discussing and evaluating the proposed ideas. On the other hand, when Ms. Hunter abruptly walked away from conversations with students, they became confused and frustrated, and they resisted the student-centered format of the lesson. This indicates that teachers cannot just assume that a student-centered lesson will lead to positive student attitudes toward learning. Instead, teachers must be conscious of the methods they use to create student-centered learning environments and repeatedly use student reactions to evaluate and modify their methods.

Since creating a student-centered learning environment is difficult and since it is important for teachers to frequently evaluate and modify their methods for creating a student-centered lesson, video analysis should be used as much as possible. By collecting and reviewing video data (with the help of colleagues), teachers would be able to analyze their nonverbal and verbal cues and look at student responses to their methods. Ultimately, this may allow them to determine which of their moves are most and least effective. Research conducted by Harford and MacRuairc (2008) when working with student teachers, shows the importance of using video analysis as a tool to promote reflective practice.

Finally, this study could lead to further classroom research. Since Ms. Hunter’s class was negatively affected by her walking away from student conversations, researchers could search for other methods that generate conversation between students without frustrating or confusing them. Additionally, it may be useful to analyze a teacher’s methods of creating a student-centered lesson over a longer period of time (a semester or a school year) to see how/if a teacher becomes more proficient at creating a student-centered learning environment. Likewise, this would aid researchers in determining how long it takes students,
who are typically exposed to teacher-guided instruction, to become comfortable with a student-centered environment. Finally, it may be useful to compare the methods used by novice and expert teachers in creating a student-centered learning environment.
REFERENCES


