

Studies in Teaching 2006 Research Digest

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Studies in Teaching – 2006 Research Digest

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A Study of Teachers' Perceptions of High School Mathematics Instructional Methods

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Introduction

Sports, members of the opposite sex, this weekend's big party, and video games are only a few of the topics that high school students daydream about everyday while sitting in class. How can a teacher compete with these non-academic subjects for space in the average student's mind when it seems as though students would prefer to think about almost anything but schoolwork? It is the role of the mathematics teacher to ensure, in spite of all the competition for attention, that his/her subject matter also is present in the students' minds. In order to do so, a good teacher must keep the attention of each student by using a multitude of instructional activities.

Review of Literature

With the inclusion of traditional and progressive teaching methods in the high school mathematics classroom, each teacher has a multitude of options for how to structure classroom activities. This split between the two types of instruction may be viewed as the difference between traditional and progressive instruction. These two forms may be kept completely separate or used in tandem. Research has proven that when used effectively, the more progressive instructional techniques are equally, if not more, effective than the traditional instructional techniques, although teachers may be more hesitant to use the progressive methods.

One study researched the prevalence of instructional activities and found these particular activities were typically used, in order from most frequent to least frequent use: "1) listening/watching/taking notes, 2) question/answer/entire class/verbal, 3) written work-routine practice, exploration, 4) using a manipulative-routine practice, exploration, 5) using technology-routine practice, exploration, 6) group work-routine practice, exploration, reporting, and 7) undirected," (Davis & Barnard, 2000, p. 12). Once again,

this study shows how teachers prefer to use traditional methods with which they are comfortable. The second half of these tasks included reform methods, and those were the tasks used less frequently.

With such a variety of instructional activities to use, some activities tend to produce greater results in student engagement and achievement than other activities. According to Sawada (2002), student learning is enhanced when teaching methods are very reformed. This is because students are more engaged when they are a part of their learning experience, and reformed teaching methods are more likely to promote increased student involvement. In addition, Briars and Resnick (2000) found that mathematics achievement can improve with the inclusion of the following instructional activities: partner/group work, the use of manipulative materials, an explanation of solutions by the students, and the use of visual aids. This finding is seconded by Craig, Butler, Cairo, Wood, Gilchrist, Holloway, Williams, and Moats (2005), who determined that teachers from high performing high schools incorporated the following into their classrooms: journaling/writing, class discussion, the use of manipulative materials, cooperative learning, debates, research projects, interactive activities, peer tutoring, and discovery. These activities force the students to really think about what they are working on, which then leads to a stronger overall comprehension of the material. By having to explain their answers, the students must do more than plugging a bunch of numbers into the calculator or reciting a formula that they memorized.

Methods

This study investigated the following research question: Among the given instructional activities (lecture, interaction, interaction-discussion and question/answer sessions, seatwork-textbook or worksheet problems, individual use of a manipulative, group use of a manipulative, individual use of technology, group use of technology, calculator use, cooperative learning, journaling/writing about mathematics, and games), which do teachers use with the most frequency and which do they believe to be the most effective?

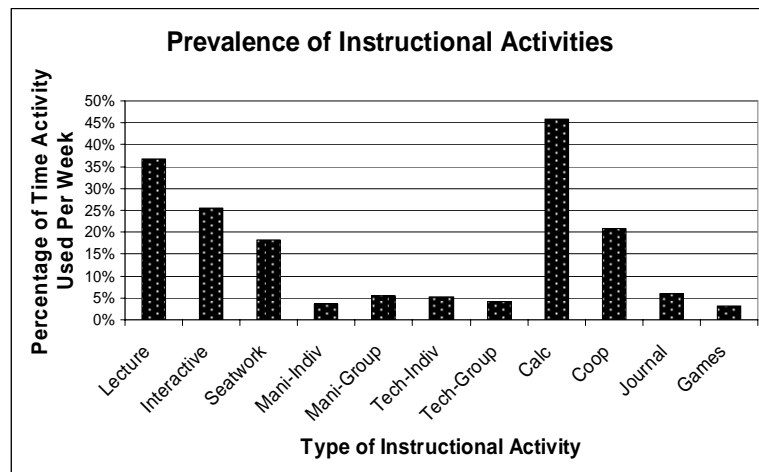
This study used a sample of seventy-one teachers in ten local high schools who volunteered to participate in this study. The most popular instructional methods were determined from a survey created by the researcher. The survey asked the mathematics

teachers to list the percentage of time that each instructional method was used in a typical week. In addition, the survey asked the teachers to describe how effective each instructional method had been for them in the past. Every participant completed this survey. Then, a small number of teachers answered a supplemental interview question, where they were asked to describe an effective lesson from the three most effective instructional methods. The interviews were audio taped for later analysis. The interviews were 5-10 minutes, took place in the teacher’s classroom after school, and were audio recorded.

Descriptive statistics were used to explore the teachers’ reported frequency of use of each method and their assessment of effectiveness of each method. In addition, the interview questions were analyzed in order to find common themes in the teachers’ answers.

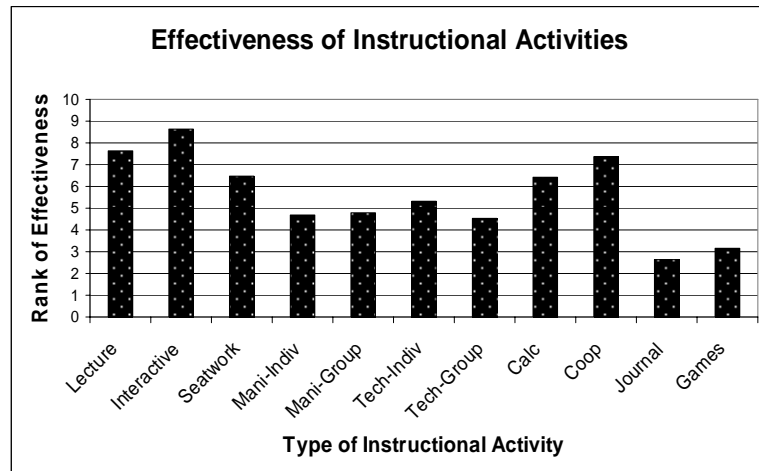
Results

This study found that the instructional methods that teachers believe to be the most effective are similar to those that they tend to use with the most prevalence. Mathematics teachers in Forsyth County, North Carolina reported that they use calculators most frequently, at 45.93% percent of the time during a typical week. Lecture tends to be used with the second highest frequency, at 36.60%. Interactive type sessions, cooperative learning, and seatwork are used with relatively similar rates of occurrences, at 25.44%, 20.75%, and 18.22% of each week, respectively. The last six instructional methods surveyed are used with similar



frequencies, with journaling used 5.88% of the time, group use of manipulatives 5.57% of the time, individual use of technologies 5.22% of the time, group use of technologies 4.19% of the time, individual use of manipulatives 3.64% of the time, and games 3.13% of the time.

In regards to effectiveness, these teachers believed that interactive type class sessions are the most effective, with an average ranking of 2.35. The ranking system placed 1 as the most effective instructional activity and 11 as the least effective instructional activity. Then lecture received an average ranking of 3.39, cooperative learning received an average ranking of 3.62, calculator use received an average ranking of 4.59, and seatwork received an average ranking of 4.55. Finally, the least effective instructional activities seemed to be individual



use of technologies with an average ranking of 5.67, group use of manipulatives with an average ranking of 6.20, individual use of manipulatives with an average ranking of 6.30, group use of technologies with an average ranking of 6.45, use of games with an average ranking of 7.82, and journaling with an average ranking of 8.35.

In addition, interviews were conducted with the four clinical faculty involved in this study in order to examine further an effective lesson that utilized their three most effective instructional methods. All four of the teachers included interactive sessions as one of their top three. The teachers used these methods in one of two ways. Interactive question and answer sessions might be used as a way to engage the students and to develop a concept. These teachers like to use these methods with concepts that the students were capable of learning through inquiry. The more questions that the teachers asked, the more the students were able to see the progression of the parts of the concept. The students would see trends that could lead to a generalization, and thus a further comprehension of the concept. In addition, this gave the students an opportunity to ask the teacher any questions regarding this lesson, because some students will need supplementary instruction for every concept that is taught. Specific examples of effective lessons with interactive sessions include a lesson on the quadratic equation and parabolas. This lesson could use interactive sessions to explore the affects of a, b, and c with the

standard equation, as well as finding the maximum and minimum values and determining the concavity of the parabola.

Furthermore, with the availability of technology for students in this generation, several teachers indicated they use calculators every day in their classrooms. One teacher stated that she could not live without her calculator. Specifically, everything involving a set of data will be explored on a calculator in her classroom, from linear regressions to correlation coefficients. Another teacher mentioned that anything dealing with graphing is done with a calculator. For example, it is possible to show graphically how to find the zeroes of a function.

These teachers also incorporated cooperative learning often in their classrooms. One teacher said that she uses cooperative learning anytime that she gives her students an activity to do. She will give them the opportunity to work in groups after everything that she teaches, whether it be on a worksheet or a game. She believes that the students will learn better when someone else explains it to them or when they are teaching a concept to someone else. A second teacher uses cooperative learning after her students have had the opportunity to see all of the goals and objectives that she tried to cover in the lesson. When working in groups, they have the chance to interact and share their thoughts with each other. Those students who did not understand the lesson will have another opportunity to hear it from their peers.

Some of these teachers also described a few of their effective lessons involving a lecture component. One teacher uses lecture when she begins a lesson. She introduces her goals, definitions, and what the lesson is all about. Likewise, another teacher tends to use lecture when presenting a new concept. For example, one teacher uses lecture specifically when she teaches solving equations. She believes that her students need to understand the steps for when to add, subtract, multiply, and divide.

Conclusion

These results show that the instructional activities that are considered the most effective are similar to those that are used with the most prevalence. However, they do not coincide exactly. The four activities that are used with the highest prevalence are calculators, lecture, interactive question and answer sessions, and cooperative learning. The four activities that are believed to be the most effective are interactive question and

answer sessions, lecture, cooperative learning, and calculator use. The three activities that are used with a moderate level of prevalence are seatwork, journaling, and group use of manipulatives. However, the three activities that are believed to have a moderate level of effectiveness are seatwork, individual use of technologies, and group use of manipulatives. Finally, the four activities that are used with the least frequency are individual use of technologies, group use of technologies, individual use of manipulatives, and games. The four activities that are believed to be the least effective are individual use of manipulatives, group use of technologies, games, and journaling.

With the advent of No Child Left Behind and the emphasis on student performance, teachers have high expectations placed on them. They must teach all of their students well enough so that students of various academic ability levels will succeed and pass their end-of-course exams. This requires that teachers focus on the material necessary to excel on these exams, and some teachers find it difficult to use inquiry-driven learning tactics to ensure that this occurs. As shown from the teacher interviews, many teachers prefer to use lecture when introducing a new concept. This allows them to control how the students absorb the new information, even if this is not the most effective way for a particular student to learn. For all students to have a similar high school mathematics experience, and thus for No Child Left Behind to have a greater chance for success, teachers of all ages need to have an equal belief about the effectiveness of each instructional activity. This will lead to the traditional and progressive instructional activities being used with a similar frequency, which would benefit all students in the classroom.

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Consequences of Teacher Response to Student Misbehavior on Classroom Engagement

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Introduction

Every day, teachers encounter a multitude of distractions, disruptions, and general nuisances in the classroom. Studies have shown that classroom disruptions and distractions are not a secondary issue to the education of children; in fact, for many teachers, teaching is sacrificed in order to monitor and control these distractions. While much study has gone into exploring the impact of student misbehavior on the classroom, there has been little research exploring the effect of teacher responses to student misbehavior on the learning environment. The question this study seeks to answer is what effect teacher response to student misbehavior has on student engagement and the total number of student misbehavior.

Literature Review

Charles (1999) defines misbehavior as an intentional “behavior that is considered inappropriate for the setting or situation in which it occurs” (p. 2). He codifies such misbehavior into five categories (aggression, immorality, defiance of authority, class disruptions, and goofing off) and emphasizes the importance of addressing the last two groups. While the first three types of misbehavior are much more serious and grave, Charles stresses the need to focus on the last two “less serious” kinds of misconduct because it is “precisely such behaviors, which no one considers serious, that drive teachers to distraction and ruin learning for everyone” (p. 3).

As defined by Charles (1999), discipline is “what teachers do to help students behave acceptably in school” (p. 3). He delineates that the aim of discipline is not merely to chastise or reprimand a child, but to cause students to “internalize self-discipline and display it in the classroom and elsewhere” (p. 3). He writes that “ideally the goal of

discipline is to reduce the need for teacher intervention over time by helping students learn to control their own behavior” (p. 3).

Research has shown that both parents and teachers rate discipline and misconduct as the chief problem in the classroom. As reported by Gallup Polls conducted by Phi Delta Kappa, from 1969 to 1985 the number one problem Americans had with public school education was the lack of discipline (with the exception of one year). In 1997 discipline was noted to be the primary concern over drugs/gangs and financial support by a historically large 7%. Even more interestingly, when asked how to improve other problems in the public school systems (drugs/gangs/violence), Americans stated that there needed to be “more discipline, more control, and stricter rules” (p. 5).

The effects of student misbehavior on the attitudes and feelings of self-efficacy for teachers have been well-documented (Brouwers, 2000; Bruning, 1984; Peterson, 1978). Brouwers (2000) reports that discipline problems in the classroom was termed the principle reason why teachers left the profession from 1995-1997. Rancifer (1993) states that teachers who lack control in the classroom not only enjoy their jobs less but also become less effective at teaching as the problem persists.

However, there are many opinions as to what “effective discipline” is. Johnson (1994) revealed that when student teachers were asked what the most effective form of discipline in the classroom was between dominant, rule-focused discipline and nurturing discipline, they chose the domineering and authoritative discipline. However, in a study by Agne, Greenwood, and Miller (1994) it was confirmed that those selected to be “teacher of the year” had more of an encouraging, and less punitive, form of discipline. Infantino (2005) discovered that students perceived disruptions differently than the teacher, and saw the teacher’s “desist techniques” as ineffective.

Kounin (1970) illustrates the importance of such choices (authoritative vs. nurturing) in his study on teacher responses to student misbehavior and what he terms the “ripple effect:” the outcome of a teacher’s reaction to misbehavior on the class as a whole (not just the student being reprimanded or warned). His findings reported that “all the experiments that were conducted demonstrated that the ripple effect was dependent upon differences in the teachers’ desist techniques” (p. 71). While Kounin found little data to support or negate the impact of harsh “desist techniques,” a follow-up study by Geva

(1985) exposed that students remembered a teacher's response to disruptive behavior *more* than the information that was taught during the lesson. Anderson discovered (1980) (along with Good and Grouws (1977)) that teachers that used a moderate amount of accountability were more effective in managing the classroom than those that "scolded" or reprimanded too much or too little.

Methodology

Subjects were four cooperating teachers and their students at East High School in Winston-Salem, North Carolina. Teacher subjects are referred to as Teacher A, Teacher B, Teacher C, and Teacher D. Student subjects are from one of the five or six classes of various ability levels that each cooperating teacher instructs. No students are identified individually.

Data on the impact of teacher's response to misbehavior on student engagement was collected by teacher observation using ethnographic methods. Each teacher was observed six times. The researcher kept field notes and also kept a tally of the number of voluntary student contributions and total number of classroom misbehavior. Voluntary student contributions were defined as any student comment or question that was academic in nature and not the result of teacher selection. The total number of classroom misbehaviors was defined as any behavior that was non-academic in nature and that distracted from the learning of the classroom. The field notes of teacher response to student misbehavior was later coded and categorized into one of five desist techniques: positive reinforcement, diversion tactic, absent response, the "Sh!" technique, or negative retaliation.

The "positive reinforcement" category was reserved for teacher responses that involved correcting a student's misbehavior by pointing out what another student nearby was doing right. A diversion tactic technique included teacher responses that distracted the student from their misbehavior through elevated excitement of the lesson. An "absent response" was the category reserved for misbehavior that the teacher was aware of but did not respond to. The "Sh!" technique was limited to negative "Sh!" responses from teachers that lasted less than one second. The "long negative responses" were punitive responses made by teachers that lasted longer than a second.

After grouping the desist techniques, the researcher conducted a correlation study examining relationships between the types of desist techniques primarily used by teachers, the numbers of voluntary student contributions, and the number of total student misbehaviors. The results will show which desist techniques result in higher levels of student engagements and lower levels of total student misbehavior.

Results

My findings are summarized in Figure 1.

Figure 1.

Teacher	Positive Reinforcement	Diversion Tactic	No Response	“Sh!” Technique	Long Negative Response	Total Student Misbehavior	Vol. Student Contributions
A	0/ 0%	2/ 6%	12/ 26%	17/ 37%	14/ 30%	46	169
B	3/ 17%	4/ 22%	6/ 33%	4/ 22%	1/ 6%	18	371
C	0/ 0%	0/ 0%	5/ 25%	4/ 20%	11/ 55%	20	36
D	1/ 2%	0/ 0%	0/ 0%	1/ 2%	44/ 96%	46	28

37% of Teacher A’s responses to student misbehavior was comprised of the “Sh!” technique. 30% of Teacher A’s desist techniques were negative responses that lasted longer than one second. 26% were categorized as “absent responses,” and the remaining 6% was spent diverting student’s attention back to the lesson at hand. On average, students in Teacher A’s class made 42.25 voluntary responses per class period. Of these 42.25 voluntary student responses, 3.25 of them were voluntary questions asked by students.

Teacher B had the lowest number of student misbehaviors; over a span of 5 hours, there were only 18. Teacher B responded to the student misbehavior primarily by ignoring student misconduct. 33% of his desist techniques were “absent responses” meaning that he ignored the student act, 22% were spent diverting the students from their misbehavior back to learning, and 17% were spent positively reinforcing negative

behavior. Teacher B also had the highest number of student contributions. Students contributed an average of 92 times. Teacher B's class also had the highest number of voluntary student questions: on average, students asked five questions per day.

Teacher C had a high amount of negative desist techniques and low numbers of student engagement. 55% of the teacher's responses to misbehavior were negative responses that lasted longer than 1 second. 20% was spent using the "Sh!" technique and the remaining 25% was categorized as an "absent response." On average, there were 9 voluntary student responses made during Teacher C's class period; there were no voluntary student questions asked in any of her classes.

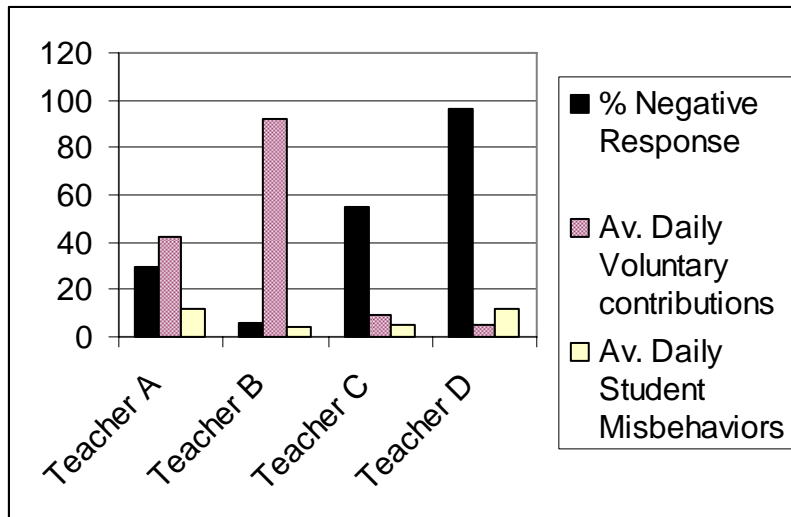
Teacher D had the highest number of negative desist techniques and the lowest number of voluntary student engagement. 96% of teacher's desist techniques were negative responses that lasted longer than 1 second. The remaining 4% was spent using the "Sh!" technique (2%) and positive reinforcement (2%). On average, Teacher D had a low five voluntary student responses per class period; of these, 2.5 were voluntary questions asked by students.

Data Analysis

My data supports that there is a relationship between the type of teacher responses to misbehavior and levels of student engagement. As displayed in Figure 2, those teachers who used positive reinforcement or diversion tactics to manage student misbehavior yielded a much higher level of voluntary student responses, while the teachers who responded to 50% or more of student misbehavior with a negative desist technique that lasted longer than one second had much lower levels of student engagement than those teachers who used other response methods.

My results do not show a correlation between the types of desist techniques used and the numbers of student misbehavior on the whole. Both Teacher A and D had the same number of student misbehaviors; yet, Teacher D overwhelmingly depended on more negative means for deterring student misbehavior. While Teacher C relied primarily on negative desist techniques, she had the second lowest number of student misbehavior.

Figure 2.



Conclusions & Implications

My results suggest that in order to increase learning in the classroom teachers should veer away from using negative and punitive forms of response to student misbehavior, and, instead, focus on using positive reinforcement or diversion tactics to steer student attention back to the lesson.

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Investigating the Causes of Math Anxiety in the High School Classroom

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Introduction

One of the main problems that mathematics teachers face is dealing with math anxiety in their students. Math anxiety is a feeling of uneasiness that is created whenever one has to complete a task that involves mathematics. Math anxiety could be caused by a number of things: unpleasant past experiences with math in the classroom, a parent conveying the message to their children that math is boring and useless, or from the attitudes of the teachers themselves. It is imperative that teachers understand the causes of their students' math anxiety. Once they understand the causes of the math anxiety, teachers can work with the students and their parents to eliminate this anxiety so students may perform to their full potential in the mathematics classroom. Research has shown that knowledgeable teachers can reduce math anxiety through changes in their instruction (White, 1997). The purpose of this study is to investigate the causes of students' math anxiety.

Review of Literature

Math Anxiety and Gender. A number of studies have examined whether math anxiety is related to gender. Seymour (1995) conducted a three-year long ethnographic interview study at several colleges, both private and public. He found that females who had high achievement levels in the classroom had a difficult time fitting in socially. The females felt they had to prove themselves to the males; they spent more time on their work to show the males that they could keep up with them in the classroom. These females also were labeled as "non-feminine and undesirable by males" (p. 448). These traits could be related to math anxiety because females feel that if they excel in math they

will be given these labels, which could cause them stress. Competition in the classroom can also be a cause of math anxiety. Males were found to not be upset by competition in the math classroom whereas females were bothered by this (p. 451). Females did not perform as well when they felt they were under pressure in a competition. Males were unaffected by the situation, whether it involved being in a competition or taking a test.

Math Anxiety and Different Backgrounds. Students' different family backgrounds could also have an effect on their levels of math anxiety. Bernstein (1992) analyzed math anxiety in single parent students in nontraditional career preparation programs related to demographic characteristics. The programs were created for adult students who were raising their children on their own or who were seeking nontraditional career paths. The author felt there was a difference in the amount of math anxiety that females and males had, and that women's level of math anxiety affected them when they entered the work force. If girls have high math anxiety during the years they are in school, they will be less likely to take math courses that are required for certain jobs. The study found that after a certain point (around the age of 14), males have less math anxiety than females. Bernstein suggested working to alleviate math anxiety at the elementary level.

Teachers and Math Anxiety. In the classroom, teachers work with students and their math anxieties every day. Several studies have been carried out to explore techniques teachers use in the classroom and their effect on math anxiety. One such study by White (1997) focused on deciding whether or not teacher techniques and teacher attitudes caused math anxiety at the secondary level. According to White, math anxiety is learned, not innate, and sixty to eighty percent of the population has math anxiety to some degree (p. 6). In his study, math anxiety was measured and then the control group was taught by using the teacher's usual methods in the classroom, and the experimental group was taught by using cooperative learning, hands-on group activities, and with deliberately positive attitudes. The results showed that neither teaching techniques nor teacher attitudes had anything to do with a student's math anxiety level after the treatment. Studies conducted by others, such as Carpenter and Fennema (1992), encourage teachers to give instruction to students of all ages in a way that will benefit all learners. From their studies, they concluded that multiple representations of material help more students to grasp the information (p. 458), which would cause students to be more

confident and not to have high levels of math anxiety. This means that classrooms that do not have multiple representations of data are sites where math anxiety can occur. Thus, teachers' actions in the classroom may be related to students' anxiety.

Students' Influences on Their Own Levels of Math Anxiety. Beilock, Carr, Holt, and Kulp (2004) analyzed how students solved math problems under pressure. They defined anxiety as manifesting itself in the form of "...intrusive thoughts or worries about the situation and its outcome" (Beilock et al p. 586). This meant that students' working memory was consumed partially from this anxiety, and students did not have as much working memory to use when taking a test or working on a math assignment. In their study, they used modular arithmetic problems to measure students' anxiety levels. Students at Michigan State University (who were not math majors) were randomly selected to participate in the low-pressure group or high-pressure group in relation to requirements for completing problems. Results showed that participants in the high-pressure group experienced more anxiety than those in the low-pressure group (p. 589). Also, students in the high-pressure groups reported not feeling as confident in their answers as the low-pressure group. Thus, students who experience high amounts of pressure could possess high levels of math anxiety.

Math Anxiety and the Curriculum. Fraser and Taylor (2003) investigated the relationship that exists between the classroom environment in the eyes of high school students and their level of math anxiety. The WIHIC survey (What Is Happening In this Class) was used to assess students' perceptions of certain aspects that exist in the high school math classroom, such as teacher support and task orientation. The Plake and Parker Revised Mathematics Anxiety Rating Scale (RMARS) was used to measure students' levels of math anxiety. Data were collected from students in grades 9-12 with the sample of 745 students existing in four schools. With the use of multiple regression analysis, it was determined that there was a strong relationship between the classroom environment and students' levels of math anxiety (p. 7).

Methodology

Subjects. The participants in this study were high school students at a city school in central North Carolina. Students were recruited from three math classrooms, including

Algebra I Honors, Algebra I, and Foundations of Math, to constitute the sample for the study.

Instruments. The instrument used in the study was the ten-item “Do You Have Math Anxiety?” self test. This test was found at <http://www.mathpower.com/anxtest.htm>, and the researcher received permission from the author to use the survey in the research.

Procedures. At the beginning of the study, the researcher gave all thirty seven participants the math anxiety test to measure their levels of anxiety. The ten students who had the highest level of math anxiety according to the math anxiety test were interviewed. The researcher asked the participants questions pertaining to their levels of math anxiety and their feelings toward how to eliminate their math anxiety. Interviews occurred at the school, during lunch and breaks. All of the interviews were audio-recorded.

Data Analysis. The survey was scored according to survey directions. Each question was rated by the student between 1 and 5. The question responses were summed, and each student’s total score was between 10 (the lowest possible score) and 50 (the highest possible score). The higher number obtained meant that students had more math anxiety. The researcher interviewed the students with the highest scores on the survey using the interview questions in Appendix B. Their responses were audio recorded for later analysis. The narrative data from the interviews were analyzed to further describe the students’ math anxiety.

Results and Conclusions

Thirty seven out of seventy five students turned in both consent forms to participate in the study and completed the survey. Only twenty six of those thirty seven students could participate in the study because eleven students did not answer all of the questions on the survey. Out of the twenty six students, the ten students with the highest levels of math anxiety (according to the survey) were selected to be interviewed. (Note: The mean score represents the average that students ranked each question. The lowest score is 1 and the highest score is 5.)

Table 1. Survey Results for All Twenty-Six.

	<u>N</u>	<u>Mean</u>	<u>S.D.</u>
I cringe when I have to go to math class.	26	2.16	0.2736
I am uneasy about going to the board in a math class.	26	2.35	0.2770
I am afraid to ask questions in math class.	26	1.42	0.1486
I am always worried about being called on in math class.	26	1.73	0.2188
I understand math now, but I worry that it's going to get really difficult soon.	26	2.65	0.2071
I tend to zone out in math class.	26	2.38	0.2832
I fear math tests more than any other kind.	26	2.69	0.3223
I don't know how to study for math tests.	26	2.38	0.3142
It's clear to me in math class, but when I get home it's like I was never there.	26	2.54	0.2786
I'm afraid I won't be able to keep up with the rest of the class.	26	1.92	0.2878

To decrease math anxiety, Student 1 said that teachers should teach in the way his current math teacher teaches in the classroom. The teacher answers all of the students' questions, walks around the room constantly to make sure everyone is working on their math work, and doesn't just give students work and "send them off to do it." Student 2 felt that better explanations of material were needed. Also, more examples and more hands on activities to work through problems instead of just book work would be beneficial.

Student 3 felt that increasing study habits and relaxing and making the classroom more fun would decrease math anxiety. "I think sometimes math anxiety is caused by the classroom because math is a boring subject." He also suggested more involvement and more teacher involvement with the students. Student 4 felt the solution was building more confidence in what you know in math. "When a topic comes up dealing with math you have that confidence so you should be OK and you won't get nervous. Your teacher should build up your confidence by making sure you have a lot of practice." Student 5 had a personal experience that helped ease their math anxiety. He stayed after school for tutoring two to three times a week, and saw an improvement in his math grade which caused his levels of anxiety to go down.

Student 10 offered several ideas of ways to decrease math anxiety. She felt that few people would want to stay after for tutoring with their teachers, but maybe if more math help was provided by other teachers they would be willing to go work with them.

She also suggested that instead of depending on the teacher for help, students could use self-help programs or learn more creative ways to study.

When looking at the table of students' survey statistics, it was interesting to see that students agreed the most on Question 7 (I fear math tests more than any other kind). The question that the students disagreed with the most dealt with answering questions in math class. This implies that the teacher was providing a comfortable setting in the classroom where students felt at ease when explaining answers in front of their peers. These students who had the highest levels of math anxiety were not afraid to give an incorrect answer in class.

Students made several suggestions as to how to ease math anxiety. They felt that teachers should teach students study habits, raise students' confidence in their mathematical abilities, walk around the classroom to help students and answer questions, and for teachers to provide more hands on activities during math class. Students felt that after school tutoring was important in decreasing math anxiety. They also suggested that students use self-help programs to answer their questions about math. Relaxing was also a key in decreasing math anxiety. Students felt that teachers could be doing a lot more in the classroom to decrease math anxiety. In conclusion, math anxiety is a reality for many students. Educators should be knowledgeable about its causes and provide supportive learning communities that assist students in overcoming it.

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Flow Theory in the English Classroom

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Introduction

Creating the proper classroom environment that is pertinent to the lesson while maintaining focus on curriculum standards may be the most difficult challenge for classroom teachers. Studies show that a moderate level of arousal is necessary for true learning to occur. Too much arousal can impede learning and cause anxiety, while too little arousal leads to boredom (Sternberg, 2002, p. 358). Flow Theory attempts to understand the relationship between group energy levels and productivity. Flow Theory is highly complex, and not fully understood, but teachers should be highly aware of its underlying principles when they are designing instruction and managing their classrooms. Additionally, Flow Theory addresses challenge, emotion, and environment in an attempt to understand intrinsic motivation. This study aims to devise ways that teachers can incorporate aspects of Flow Theory into the English classroom to better engage students.

Review of Literature

If the students are not engaged, learning cannot take place (Bolmeier, 1995). Flow Theory is the study of intense engagement. Flow Theory is complex; there are countless factors that must be considered, and Flow may not be applicable to all circumstances. However, the value of understanding the key concepts of Flow Theory cannot be overstated. Flow Theory is multi-faceted, but so are students of the future.

Flow Theory was developed in the 1960s by Csikszentmihalyi to understand how people such as rock climbers, chess players, symphony conductors, or professional athletes are able to maintain a high level of focus during their activity without being distracted. It is an attempt to uncover the complexity of intrinsic motivation. Because Flow Theory is so complex, there are many definitions of Flow in existence. Whalen

(1998) describes Flow as the “state of arousal when learning most frequently occurs.” Another study by Parr, Montgomery, & DeBell (1998) describes Flow as a “merging of action and awareness; centering of attention on a limited stimulus field; letting go of self-consciousness; a feeling of competence and control; and being intrinsically motivated.” Shernoff et. al. (2003) say “Flow Theory is based on a symbiotic relationship between challenges and skills needed to meet those challenges.” Chan and Ahern (1999) report on people in a state of Flow that become so engrossed in their task that they may feel a warped sense of time and experience such intense concentration that they lose all self consciousness. When the task is over, there is an overwhelming sense of accomplishment and gratification. These feelings are so intense that the feelings themselves become motivation enough to repeat the activity. In essence, Flow occurs when concentration, interest and enjoyment are simultaneous.

In order for students to be engaged, concentration, interest and enjoyment must all occur simultaneously. (Shernoff, Csikszentmihalyi, Schneider, & Shernoff, 2003). The problem is that a majority of student activity is still centered around non-interactive activities. This is where Flow Theory comes in. In the Flow classroom, positive emotions and intense challenge are essential for high student engagement. Also, perceived student control and a high level of student relevance to the outside world are prevalent. The idea is that by creating strong internal motivation, teachers can create life-long learners---people who are turned on by learning. Chan and Ahern (1999), feel that a synthesis of teaching and motivation are essential for the modern classroom. Flow Theory encapsulates emotion and attitude, and the focus of instructional design is learning and achievement; however, the optimum effect of both can be simultaneous. If the goal of an instructor is to teach, and people learn best when in a comfortable, enjoyable environment, instructional designers should make this synthesis their focus.

By maintaining this comfortable, enjoyable environment, intrinsic motivation can be fostered. A study by Younger and Warrington (1999) confirms the importance of enjoyment in the classroom. In a survey, both male and female high-school students ranked “teacher enthusiasm” high on their list of motivating factors. Also high on the list is “student involvement” and “teacher commitment” to the class. All of these suggest the importance of positive emotions in the classroom. Additionally, students appreciate a

teacher who clearly defines the goals of the lesson. When lessons have proper structure, anxiety in the class is lowered and comfort is increased. A similar study on boredom in the classroom (Kanevsky & Keighley, 2003) put forth the maxims that “(1) Learning is the opposite of boredom, and (2) Learning is the antidote to boredom.” In naming the 5 C’s that make a learning experience instead of a boring experience, Kanevsky and Keighley have described Flow. The 5 C’s “control, choice, challenge, complexity and caring teachers” are essential for Flow to happen and to truly engage learners. Whalen’s (1998) study points out that challenging experiences that require genuine thought will make students more excited about learning inside and outside of school. In instructional design, lesson planners need to make each step slightly more challenging than what the students are accustomed to, but not too difficult to create anxiety.

According to Meeks (1999), Flow can be incorporated into the classroom by creating and maintaining the proper classroom environment. The author stresses the importance of making school relevant to the real world. The author concludes with four “Principles of Engagement”: (1) Learners are more engaged when they feel they can be successful, (2) Learners are more engaged when they feel that the material will have purpose in their lives, (3) Learners are more likely to engage in an anxiety-free environment, (4) Learners are more likely to engage when the instructor is someone they want to emulate, someone who they “like, respect, admire [and] trust.”

Methodology

The researcher will observe ten class periods of four different English teachers for a total of 40 hours. As a non-participant observer, the researcher will note the energy levels of the classroom students as they enter the classroom and begin class. The researcher will choose four students: two who appear to be at a high level of energy, and two who appear to be at a low level of energy. The researcher will note the classroom activity and the method by which the teacher entered into the lesson. The researcher will categorize the instructional method into high level of involvement and low level of involvement, based on categories designed through research into Flow Theory. Activities that require high level of involvement are student centered and include, group work, individual seat work, writing activities, test or quiz taking, and quiet reading. Activities

that require a low level of involvement are teacher centered and include, watching films, listening to lectures, class discussions, and out-loud reading.

The researcher will note the level of engagement of the four students as the teacher progresses through the lesson. Because prolonged concentration is key to understanding Flow Theory, the researcher will mark the student as engaged if they are engaged for a majority of the activity. If the student appears disengaged for a majority of the activity, the researcher will mark the student as disengaged. The researcher will restart this process every time the teacher modifies the instructional method during the duration of the class period. The researcher will then analyze the data for any trends in the classroom.

This will be a narrative study. The researcher's narrative will describe the teaching methods used and their effects on students of different energy levels. The researcher will assess the potential for the application of Flow Theory to the English classroom.

Results/Conclusions/Implications

Because my research was in the application of Flow Theory, I will categorize my results according to the elements of Flow.

Pertinence. The material being studied must be pertinent to the student's life. The student must feel like he is in control of his own education. Activities that are student centered, as opposed to teacher centered, have a higher level of engagement because they require more concentration on the part of the student. Activities that require a high level of concentration include, group work, individual seat work, writing activities, test or quiz taking, and quiet reading. Activities that require a low level of concentration include, watching films, listening to lectures, class discussions, and out-loud reading.

Of the 114 classroom activities, only 40 were student centered or 35.1 percent of the activities. A majority of the activities (64.9 percent) were teacher centered. Because Flow describes intense concentration, I marked the student as engaged if they were on-task for a majority of the activity and disengaged if they were off-task. As a reference point, for 61 of the 114, or 53.5 percent of the classroom activities observed, a majority (75%-100%) of the sample students were engaged for a majority of the time. During the lessons that were student centered, a majority (75%-100%) of the students were engaged

for 32 out of the 74 lessons, or 44 percent of the time. During the lessons that were student centered, a majority (75%-100%) of the students were engaged for 29 out of the 40 lessons, or 73 percent of the time. These statistics are also concurrent with research—students who are challenged and in control of their own learning will be more focused and have a more valuable learning experience.

Anxiety-Free Environment. Another vital aspect of Flow Theory that I observed is the creation of an anxiety-free environment. An essential component of Flow is the balance between challenge and ability level. If the task is not challenging enough, the students will become bored as the assignment will seem monotonous. If the task is too challenging, then the students will be filled with anxiety and be unable to truly engage.

This creates a difficult conundrum for teachers. I observed a teacher who wanted the class to do well on an important quiz. If the teacher made the quiz seem too easy, then the students wouldn't adequately prepare for it. Conversely, if the students were too worried about the quiz, their performance on it would also suffer. The teacher encouraged the class to study hard for the quiz the day before. On the subsequent day, the class appeared to be a little anxious about the quiz. The teacher calmed them down and reaffirmed their ability. He told a few light jokes to relieve some of the stress imposed by the quiz. During the quiz, the class was silent and focused on the task at hand. After the quiz, the teacher read off the quizzes to assess them and to release the stress of having to wait 24 hours for the results. The teacher was pleased with the results and told the class so repeatedly.

Instructor Charisma. Of all the aspects of Flow Theory, the personality of the teacher is the hardest to describe or quantify, although it is vitally important. Instead of eliminating emotion from the classroom, Flow Theory attempts to understand emotion's importance to the learning environment. If students are apathetic to the material or teacher, it is less likely that they will be engaged in the classroom. Enjoyment of the activity is requisite for Flow and engagement. I am in no way advocating for teachers to change their personalities as that would be an impossibility; in fact, I feel that teachers cannot teach outside of their personalities. I do, however, believe that teachers should be more aware of the impact that their personality has on their students.

Summary. I have witnessed countless examples of Flow Theory in action during my observations, mostly without the teachers even aware of Flow, but just being good, conscientious teachers. Flow Theory simply brings to the foreground rules for engagement that can be applied to any learning environment. Lessons must be made so that students can relate them to their own lives, or the lessons will have little perceived value and be less likely to sink in. Teachers should model behavior that reduces anxiety by creating classroom environments that are inviting to new ideas without fear of undue criticism. Some stress is good in the classroom, but instructional designers need to eliminate negative stress by making classroom guidelines and expectations clear. Teachers need constantly to challenge their students—without making unrealistic expectations—in order to combat boredom. Teachers need to know their students and plan lessons according to students’ ability level, but should always be prepared to improvise. Students must believe that they will succeed at what they attempt. Teachers need to be aware that their own personalities are reflected in their classrooms, even unconsciously determining the emotions in the room. Just keeping these thoughts in mind will make teachers more effective in the classroom.

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Teaching Personas: Static to Dynamic Styles

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Introduction

A teacher's persona influences the pace, direction, and mood of the classroom. As teachers consider their classroom persona it is important to understand and react to the influence the persona has on the classroom environment and ultimately student learning. The teacher persona exists on a spectrum, varying from static to dynamic. In addition, each teacher persona is so intricately incorporated into communication the teacher can be unaware of the message others perceive. Gaining a consciousness of the teaching persona can lead to meaningful communication, especially identifying specific components which heighten student engagement. The question this study seeks to answer is: Does a static or dynamic persona bring about optimal student engagement?

Review of Literature

Emerson said, "The tell-tale body is all tongues (Manley, 2004). Testimony to Emerson's words, past researchers have sought to pin point the teacher acts that in turn create the best student engagement; they have sought to study the tell-tale body in order to master the language of students. In hopes that with critical reflection of the teacher persona exact identifiable characteristics would emerge so as to improve instruction. For our purposes, a dynamic persona is one that includes a variety of motion, voice change, and facial expressions (Harris, 1977). A static persona employs fewer or no instances of motion, voice change, and facial expression.

Related to studying the influence of teacher personas on classroom engagement are teacher effects studies. "The teacher effects research represents a line of studies in which attempts were made to identify those teacher behaviors that were related to student achievement gain" (Rosensine, 1995, p. 63). "The modern era of [teacher effect] research

began with the work of Medley and Mitzel and Flanders. The largest number of teacher effects studies were conducted during the 1970s” (Rosenshine, 1995, p. 264). Then during the 1980s researchers such as Brophy, Good, Rosenshine, Stevens, Gage, and Needles summarized the studies, “[citing] and [building] upon the instructional findings of others” (Rosenshine, 1995, p. 264). These studies conclude two important findings for teaching: “1. the importance of teaching in small steps and 2. the importance of guiding student practice” (Rosenshine, 1995, p. 264).

“Educators, psychologists, anthropologists, and sociologists define body language or nonverbal communication as communication without words (Miller, 2005, p. 28).” In my study I categorize elements of nonverbal communication/dynamic teacher acts into four components: hand movements, facial expressions, voice inflections and acting or pantomiming. The uses of these four components of nonverbal communication identify a dynamic persona. “Anthropologist Edward T. Hall postulated that human communication employs at least ten primary message systems, only one of which is verbal (Fausti, 1972, p. 108).” In fact, “experts suggest that only seven percent of a message is sent through words, with the remaining 93 percent sent through facial expressions (55 percent) and vocal intonation (38 percent) (Miller, 2005, p. 28). These statistics are not meant to down play verbal communication; however, they are meant to underline the significance of nonverbal elements of communication during classroom instruction.

A teacher, realizing the importance of both verbal and nonverbal communication can then adjust his or her teacher persona or use of whole communication to reach students in the best possible means. However, student engagement is not that simple, especially for teachers. Teacher “audiences are largely involuntary, that is, [students] are “expected” to be present (Fausti, 1972, p. 89).” Therefore, teachers are in a constant need to employ persona characteristics that will encourage student engagement. But how does a teacher learn a persona that will engage students? To answer this question, I started to explore professions that parallel teaching, in that elements of dynamic personas can heighten engagement. In my exploration I found articles of former actors turned teachers and how their expertise and practice as actors positively influenced their students’

engagement. The insight these teachers offer is useful in defining specific characteristics of dynamic personas; therefore, engaging students during instruction.

Dobson's study "From Spotlight to Fluorescent Bulb: Aesthetic Dimensions of Personal, Practical Knowledge in An Actor Training to Be A High School Teacher" looks at being "on", creating nuance, and using drama as a methodology. Ella, the once actor gone high school teacher, defines being "on" as "performing; [the] bell will go and you will put on your performance face"... "establishing a heightened sense of awareness and presence in the moment, an elevated with-it-ness, being tuned in to the now, a focusing and concentrating of the mind, body, voice (Dobson, 2005, p. 334)." For Ella, being a performer in the classroom is in no way insincere; in fact, being "on" is authentic. It is to create for the student a connection to something real through a whole body performance. Working from an established classroom nuance furthers the idea of creating a connection for the student. Nuance extends on and from the performer/teacher. It is first to know self as performer, knowing when and how much to give in order to engage but reserve energy. Elements of a dynamic persona, if used too frequently, can drain the teacher and lose novelty. In addition, nuance is understanding the audience, their "[interests] and [motivations] (p. 335)." For example, a teacher sensing students are disengaged may heighten voice pitch, clap, or embody a character being studied. Employing these elements of a dynamic persona would testify to the teacher's ability to read the audience i.e. has a sensitivity to nuance in the classroom.

Methodology

Subjects

The subjects of this study are four English teachers and their students in a secondary school in Forsyth County, North Carolina. To ensure confidentiality the teachers are referenced as Teacher A, Teacher B, Teacher C, and Teacher D. The students vary in grade, age, and ability level.

Methods/Procedures

This is a qualitative study using non-participatory observations to research the effect of teacher persona on student engagement during instruction in secondary English classrooms. In collecting my data, I observed each teacher a total of ten times, totaling to forty hours of observations. Each class period is divided between teacher and student

observations. The breakdown of observations is ten minutes of teacher observation followed by five minutes of student observation. This ten minute to five minute pattern is repeated at the most three times during each class period.

During the observations I took field notes using a tallying method to keep track of identified acts of a dynamic persona and acts of student disengagement. Dynamic acts of instruction include use of facial expressions, hand gestures, voice manipulation, and instances of pantomiming. Acts of student disengagement include talking off task, grooming (including nails, hair, and skin), doodling, head down or sleeping, staring off or day dreaming, and walking around the room without permission.

The data was organized using the following graphs:

Start Time: ____ End Time: _____

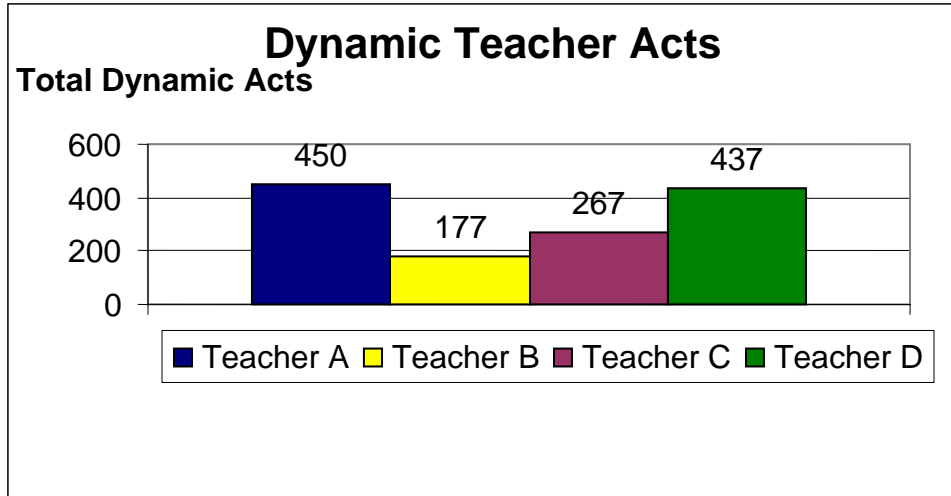
Start Time: ____ End Time: _____

Face	
Voice	
Act/Pantomime	
Hands	

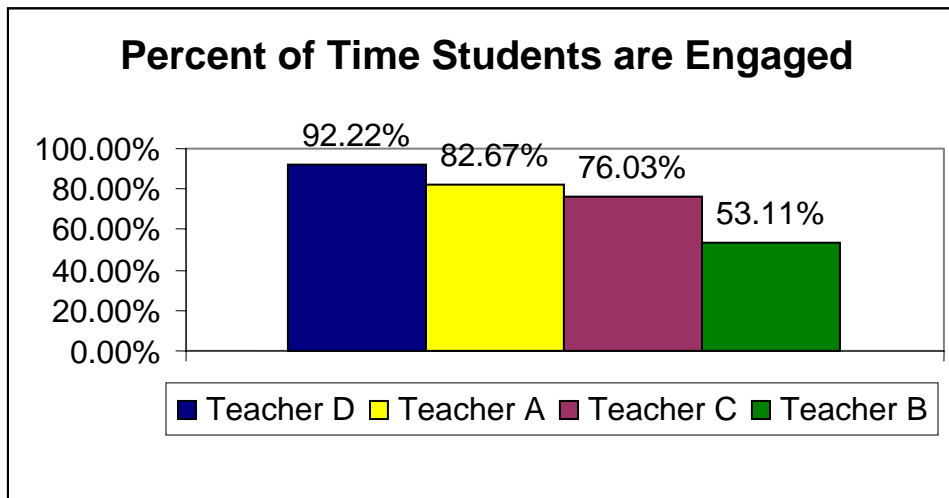
Talking Off Task	
Grooming (hair, nails, skin)	
Doodling	
Head Down/Sleeping	
Staring Off/Day Dreaming	
Walking Around Room w/o Permission	

Results and Conclusions

The data shows that the participating teachers do incorporate a varying amount of dynamic teacher acts during instruction and these teacher acts do have an influential relationship to student engagement. As seen in the graph below, teachers A and D incorporated the most dynamic acts into instruction while Teachers C and B incorporated the fewest dynamic acts into instruction. Teacher A had the highest amount of dynamic acts with a total of 450. Teacher D had the second highest amount of dynamic acts with a total of 437. Teacher C had a total of 267 dynamic acts and Teacher B had a total of 177 dynamic acts.



In relation to the amount of dynamic acts, the level of student engagement rose or fell in relation to a high or low amount of dynamic teacher acts. As seen in the graph below, teachers A and D, who had the highest totals of teacher dynamic acts, had the highest percentages of student engagement at 82.67% and 92.22% respectively. Conversely Teachers C and B, who had the least amounts of dynamic teacher acts, had the lowest percentages of student engagement at 76.03% and 53.11% respectively.



Another interesting trend in the data is the relation between Teacher A and Teacher D. Both teachers incorporated a substantial amount of dynamic acts into instruction. As said before, Teacher A had the highest amount of dynamic acts with a total of 450, while Teacher D had a total of 437 dynamic acts. However, Teacher D had a higher percentage of student engagement than that of Teacher A. This trend may reveal a peaking of student engagement despite the number of dynamic teacher acts or, as

postulated in Dobson's article in the literary review section, there is an exact point at which a teacher is "on," and steering from this point, with fewer or more instances of teacher acts decreases student engagement. In addition, Teacher D besides having the highest of percentage of student engagement at 92.22%, also had the most equal occurrence of all four dynamic acts; while the other teachers constrained their personas to only three of the four dynamic teacher acts. The four dynamic acts used by Teacher D were facial expressions, hand movements, voice intonation, and acting or pantomiming. The dynamic act incorporated almost solely by Teacher D is acting or pantomiming.

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Finishing Strong: Student Engagement During the Final Minutes of Class

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Introduction

A summation of an educator's leadership, time management and student engagement arrives during the final minutes of each class period. Class period wrap up techniques also serve as valuable indicators of the teacher's classroom management techniques and how engaged his or her students are in the lesson. How teachers end class also plays a valuable role in the short and long term building of content organization, as well as illustrate the relationship between student engagement and classroom management. The questions this study seeks to answer are: How do teachers spend their final minutes of each class period, how do their techniques impact student engagement, and how engaged are students during the final minutes of class?

Review of Literature

Elmore (2006) cites four major sources of wasted instructional time ("classroom processes," testing, test preparation and "end-of-school letdown") in which students are not engaged, and estimates there are 245 hours of lost instructional time per year. Compounded 12 times, that equates to nearly 3,000 hours during a student's educational career. After classifying classroom activity as "preparatory," "new content" or "review/assessment," Wells (2005) results suggest teachers used the final five minutes of class time for instructional activities, with a majority of the activities involving new content. Her results also note that students spend two of the last five minutes of each class doing nothing, which over the course of an entire school year results yields six hours of unproductive class time.

Gad Yair (2000) helps illustrate the gaps between learning opportunities and student engagement through students' physical presence and their thoughts during class. By "estimating the extent to which instructional methods and strategies influence the prevalence of students' engagement in classrooms," His research reveals students are

engaged (on average) just 54 percent of the time, and that the use of progressive learning strategies—particularly group work with teams made up of integrated genders, races and ethnicities—helps gain more attention than teacher-centered lectures.

Lederman, Gess-Newsome, & Latz (1993) looked at classroom management by examining how science teachers' conceptions of subject matter and pedagogy develop and change as they proceed through their secondary science methods course. Twelve teachers were interviewed four separate times during the student teaching process to keep track of changes in the students' perceptions of knowledge structure and patterns. Results suggest that new teachers do not have stable grasps of pedagogy or knowledge structures. They also suggest that providing students with more opportunities to personally reflect upon the subject matter, as well as more chances for students to view each other's reflections, would enrich schemas and move away from traditional college-style lectures in the high school classroom.

Scribner (2003) examined student engagement and its role in teachers' overall workload by collecting data from three high schools over the course of two years. Results indicated that teachers work as multifaceted learners and often call upon multiple experiences to help solve present dilemmas. Too often, however, dilemmas are solved the moment they arrive, through "reflection in action," which over the course of an entire semester does not benefit the multi-faceted learners in the classroom. Incorporating multiple experiences, particularly within the same class period, calls for more classroom management for teachers and leads to better results.

Methodology

This qualitative study used descriptive research to illustrate how teachers use the final minutes of each class period. Four English teachers and their students at East Forsyth High School in Kernersville, North Carolina were observed ten times, totaling forty hours of observation. There were three female teachers and one male, all with substantial teaching experience. They taught students in grades 9-12 with a wide range of ability levels.

The researcher measured student engagement and the teacher's classroom management during each class period as well. Observations were recorded every five minutes, starting at the beginning of class, noting the teacher's actions, student behavior

and levels of engagement. The teacher's verbal and non-verbal communication, instruction and classroom activity were described, as were each student's behavior and level of engagement. The researcher categorized students as "engaged" if their verbal and non-verbal communication suggests that they were paying attention to and taking part in the teacher's lesson. Examples of engaged behavior include eye contact with teacher or speaker, verbal participation in the activity, taking part in group work, and following directions to read, write, etc. Possible examples of disengaged behavior include talking to neighbors, lack of eye contact with teacher or speaker, sleeping, and doing work for another class. During the final five minutes of each class period, the same parameters were recorded every minute. Observations ended when the bell rang.

Data was analyzed following the completion of all 40 hours of observation, in an attempt to find patterns in how teachers use the final minutes. In addition, the data collected during the minutes leading up to the final minutes illustrated how the first 42 minutes of each class period influence the final five, as well as suggested relationships between classroom management and student engagement.

Results

The classroom management techniques teachers used fit into eight categories: announcements, leading discussion, free time, administering quiz, monitoring, handing out/collecting, conferencing and other. Announcements involve the teachers sharing information about activities such as attendance, scheduling and homework. Leading discussion represents time spent presenting information to the class, which ranges from straight lecture to open discussion. Administering quiz only applies when the teacher calls out the questions orally. Monitoring represents any time the teacher spends supervising his or her students without interacting with them. Examples of monitoring include supervising students as they work in groups, read silently to themselves or begin working on homework. Handing out/collecting materials pertains to time spent distributing and/or collecting items like homework, quizzes and graded material. Conferencing includes any one-on-one interaction between the student and teacher. Free time includes time when the teacher ended class early and left students to do what they please. Examples of other during the study were computer troubleshooting and reading aloud to students.

Figure 1 illustrates the distribution of classroom management techniques during the final five minutes of class. Teachers spent the majority of their time leading discussions and monitoring, followed by conferencing, providing free time and making announcements. The least amount of time was spent doing other activities, administering quizzes and handing out and collecting materials.

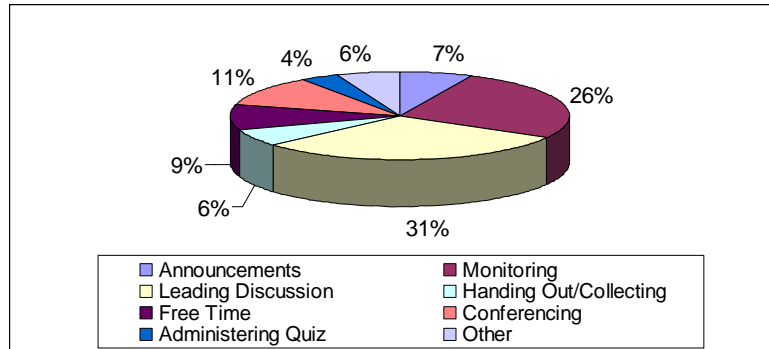


Figure 1. Classroom management during the final five minutes of class.

Figure 5 illustrates the amount of time students were engaged during the class time leading up to the final five minutes of observation. Teacher A's students were engaged 93 percent of the time, teacher B's 85 percent, teacher C's 73 percent, and teacher D's 84 percent.

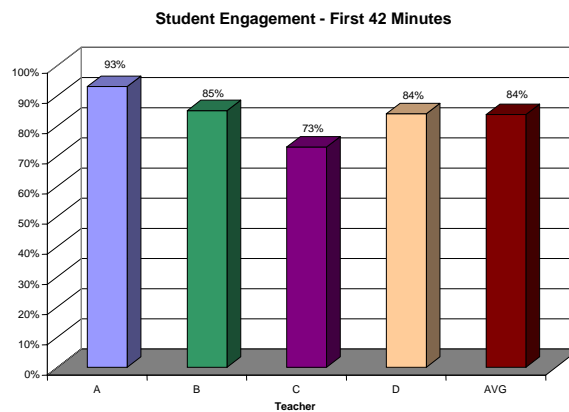


Figure 5. Student Engagement during the first 42 minutes of class

During the final five minutes of class, figure 6 shows teacher A's students were engaged 63 percent of the time, teacher B's 73 percent, teacher C's 37 percent and teacher D's 66 percent.

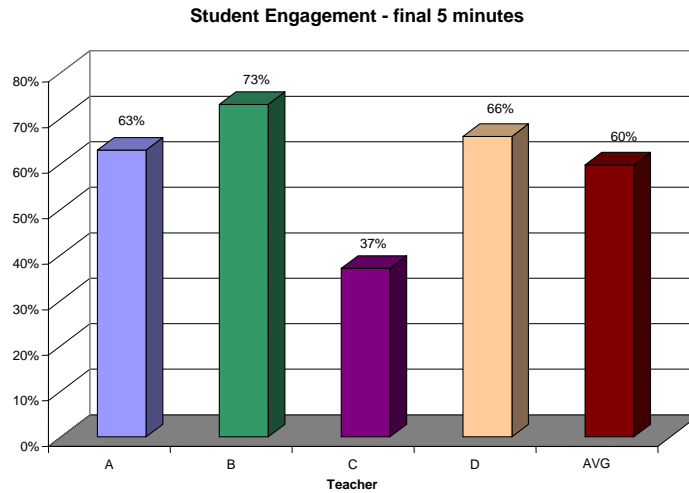


Figure 6. Student Engagement during the final 5 minutes of class

Conclusion

If “finishing strong” requires student engagement, then this study suggests teachers and their students are limping to the finish line. Despite a wide variety of classroom management skills during the final five minutes of class, all four teachers experienced drops in student engagement. Engagement dropped an average of 24 percent when compared to engagement levels during the time leading up to the final five minutes of class.

On average, the teachers spent about 90 seconds leading discussions, 75 seconds monitoring activities, 30 seconds conferencing, 15 seconds making announcements, 14 seconds handing out and/or collecting materials, and 12 seconds administering quizzes, leaving 14 seconds for other activities and 25 seconds of free time. Classroom management techniques vary widely between the four teachers, however, as none of them practice all eight categories. Three of the four teachers spent more time leading discussions than anything else, while one spent no time doing it and chose to use much of the final five minutes monitoring and conferencing instead.

Each teacher also spent a sizeable portion of the final minutes offering students free time. Most free time was a result of teachers completing their lesson plan with a few minutes to spare. It is also worth noting that the teacher with the lowest level of student engagement also offered the least amount of free time.

It would be premature to assume teacher A's classroom management techniques would always produce the most student engagement, because this study does not take into account variables like teacher age, gender or personality, class size or time of day, and student age, gender and ability level. It does however suggest a relationship between student engagement and leading discussions during the final five minutes of class, as the results show that the more teachers did it, the more engaged the students were.

In any case, this study suggests teachers are far more successful in engaging students during the minutes leading up to the end of class than they are during the final five.

The conclusions drawn from this study are not intended to criticize the teachers who were studied, but rather to provide information about how teachers use the final five minutes of class and how engaged students are as the class period ends. There is a time and place for each of the nine classroom management techniques in the classroom, and perhaps raising teachers' awareness of their own techniques, they may be able to rearrange their lesson plans and teach with a heightened awareness of student engagement.

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A Comparison of Virtual and Traditional Chemistry Laboratories

by

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December, 2006

Introduction

There is a growing trend toward using virtual computer chemistry laboratories as a replacement for traditional “wet” chemistry laboratories. The National Association of Science Teachers recommends that a minimum of forty percent of instructional time be spent on laboratory work. This can be both tremendously expensive and time consuming for teachers. The use of virtual laboratory programs can save both time and money as well as being environmentally responsible; however, the National Association of Science Teachers, the College Board, college chemistry professors, and secondary teachers have all expressed concerns that the trend toward using more virtual laboratories will result in a lack of authentic laboratory experience for students entering college.

If research can show that virtual chemistry laboratories are equivalent to traditional chemistry laboratories, virtual labs could become an effective method of integrating more laboratory work into the curriculum without the concerns of environmental and chemical costs. In an effort to provide students with a richer laboratory experience, this study attempts to determine the effect of using virtual laboratories as a replacement for traditional laboratories on student content knowledge and attitudes.

Review of Literature

Traditional Chemistry Laboratories and Virtual Laboratories

Carnevale (2003) discusses how virtual chemistry labs allow students to conduct experiments without coming into contact with dangerous chemicals or laboratory situations. Students are also able to repeat experiments as many times as they want without regard to chemical waste and expense. Several problems with virtual labs were

also discussed within this article. One is that, it is expensive and time-consuming to develop a virtual lab that includes all possible variables that students are likely to encounter within a real lab (Carnevale, 2003).

Geban, Askar, and Ozkan (1992) investigated the effects of computer-simulated experiment and the problem-solving approach on students' chemistry achievement, science process skills, and attitudes toward chemistry at the high school level. 200 ninth-grade students were given a chemistry achievement test, a science process skills test, chemistry attitude scale, and a logical thinking ability test. Two teachers randomly assigned three teaching approaches to three laboratory classes. One class was assigned the "investigative approach," one class was assigned computer simulated experiments, and one class was assigned a traditional approach to lab work. The study found that computer-simulated experiments and problem-solving experiments produced significantly greater achievement in chemistry and science process skills than the conventional approach to experiments. The computer-simulated approach produced significantly more positive attitudes toward chemistry than the other two methods, and the conventional approach was found to be the least effective (Geban, et al, 1992).

Virtual Laboratories as a Supplement to Traditional Laboratory Work

Because of the economical and environmental advantages to using virtual laboratories rather than traditional lab work, studies detailing the use of virtual laboratories to replace traditional laboratories are of interest to science educators. Woodfield, et al. have developed a series of laboratory simulations called *Virtual ChemLab*. These simulations were designed for freshman- and sophomore-level chemistry classes. The simulations are designed to connect the theory of the classroom with the practice of the laboratory while teaching analytical thinking skills. Woodfield, Catlin, Waddoups, Moore, Swan, Allen, and Bodily (2004) focused on student opinion obtained by survey and direct observation when students used the virtual laboratories. Students liked the freedom to explore the chemistry laboratory in a safe environment. They also appreciated the ability to perform experiments multiple times. The study found that students with different learning styles responded differently to the virtual laboratory. Students who prefer a large amount of structure and guidance did not perform as well on tests of comprehension given after the virtual lab as students who prefer to explore on

their own. The conclusions that the researchers reached were: the virtual lab provides “practical experience” by connecting classroom theory with real world lab work, it provides a realistic learning environment for different learning styles, and the virtual lab helps overcome the tendency of students to expect “cookbook” labs by overcoming restraints of traditional labs including costs, toxic waste, and safety.

In another study, Woodfield, Merritt, Andersen, Miller, Simmons, Stranger, Waddoups, Morre, Swan, Allen, and Bodily (2005) examined the attitudes and performance of students in an organic chemistry course when they were given both virtual laboratories and traditional wet chemistry laboratories. Student attitudes were examined by survey, and in general, the students that thought the organic simulation was valuable and easy to use were more likely to achieve a higher grade in the course. Most students said they liked using the virtual chemistry labs and a comparison of average class grades from years previous and the groups that used the virtual labs showed a significant increase in performance. During one term where students used both virtual labs and traditional labs, a significant jump in the number of A’s on the final examination was observed.

Summary

Research suggests that using technology, simulations, and virtual laboratories are effective tools to improve both student performance and student attitude in science classes. With escalating concerns about the environmental, safety, and economic costs of traditional chemistry laboratories, the use of virtual laboratories as a replacement for some traditional laboratories is of interest to educators. More research is necessary in order to determine if virtual laboratories are an environmentally and economically responsible alternative to traditional wet chemistry labs at the high school level.

Therefore, this study will investigate the following hypotheses:

1. There is no difference in student achievement between a virtual and traditional lab activity.
2. There is no difference in student attitude for virtual and traditional lab activities.

Methodology

Two chemistry laboratories were chosen. The labs were chosen by the regular classroom teacher to fit in with the regular curriculum of the two intact chemistry classes. Each of the two classes that participated in the study was randomly split in half by the regular classroom teacher. One half of students completed the virtual electrolytes lab, and the other half completed the traditional electrolytes lab. During the next lab period, the half of the class that completed the virtual electrolytes lab first, completed the traditional precipitates lab, and the half of the class that completed the traditional electrolytes lab first, completed the virtual precipitates lab. The regular classroom teacher gave both classes the same pre-knowledge assessment to determine pre-existing knowledge before students completed the laboratory. After each lab, all participating students were given the same post-knowledge assessment. After both types of labs were completed, all participating students completed an attitude survey to determine preference for laboratory type. Figure 1 details this process.

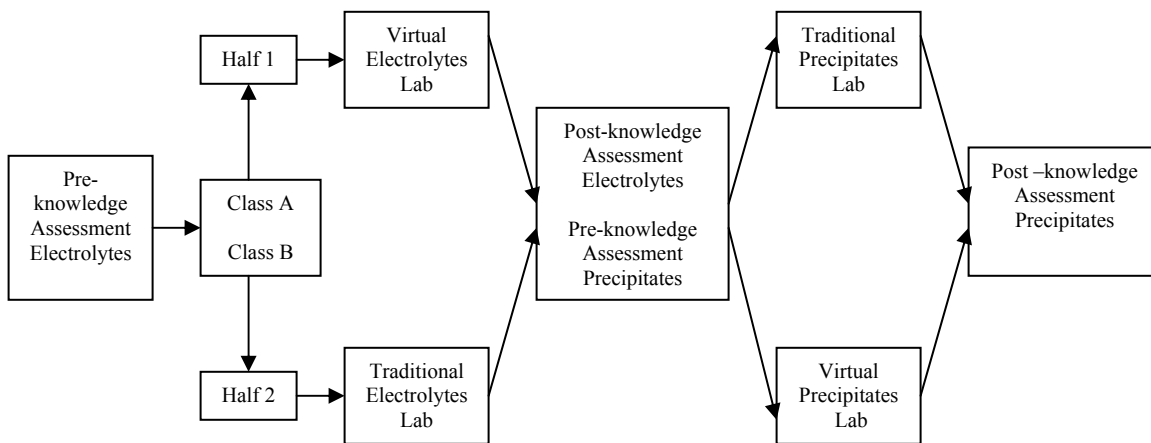


Figure 1. Schematic of the study design.

Results and Conclusions

Each group (virtual and traditional activities) was post-tested after each type of laboratory activity. Student pre- and post-test scores were analyzed with respect to type of laboratory activity, and data was analyzed using an ANCOVA. The independent variable was the type of laboratory activity. Traditional and virtual (or computer based) lab activities were compared. The dependent variable was the post-test score, and the

covariant was the pretest score. There was found to be no statistically significant difference between test scores of students completing the virtual lab and students completing the traditional lab ($\alpha = 0.05$).

Table 1. ANCOVA output showing no significance for differences between virtual and traditional lab post-test scores.

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	7.628(a)	2	3.814	1.244	.295
pretest	5.214	1	5.214	1.701	.197
lab type	3.247	1	3.247	1.059	.307
Error	205.358	67	3.065		
Total	4709.000	70			
Corrected Total	212.986	69			

a R Squared = .036 (Adjusted R Squared = .007)

During the qualitative portion of the study, student responses to open ended survey questions were analyzed. It was found that 60.6% of students thought the virtual lab was easier to complete. 72.7% of students thought that they learned more from the traditional lab, and 69.7% of students liked the traditional laboratory more.

Analysis of the post-test scores showed no significant difference in content knowledge between virtual and traditional versions of the same laboratory. The first null hypothesis that there is no significant difference in student achievement between a virtual and traditional lab activity is retained.

The majority of students participating in this study preferred the traditional version of the laboratories that they completed. The second null hypothesis that there is no difference in student attitude for virtual and traditional lab activities is therefore

rejected, and its alternative hypothesis that there is a difference in student attitude between virtual and traditional lab activities is accepted.

Results cannot be generalized because the sample size was small, and only two labs were studied. The use of virtual laboratories as an alternative or supplement to traditional laboratories appears to be a viable tool to facilitate laboratory experience in the chemistry classroom. Although further research is necessary using more students and different laboratories, the results of this study suggest that there is no difference in student comprehension of laboratory topics between a virtual and traditional version of the same laboratory. This could be significant to validate the use of virtual labs as a supplement or replacement for some chemistry laboratories.

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The Effects of Three Different Modes of Lab Preparation on Student Understanding and Affect for Animal Behavior

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December, 2006

Introduction

It has consistently been found that laboratory activities in the science classroom are an important and integral part of understanding science concepts. Not only does practical work increase student understanding of science concepts, but it has also enhances student affect for science in classes (Freedman 2001; Jelinek 1998; Ertepinar and Geban 1996). It is important, then, to research ways of teaching classroom lab activities that will increase student achievement and enjoyment of science. This study seeks to improve laboratory learning and student affect toward science in the high school Biology classroom through three different modes of lab preparation.

Review of Literature

Experiential work is widely accepted as an important part of science education. Hands-on practice gives students a chance to see the current unit at work and to connect an abstract idea with a real-life scenario or a representation of it (Jelinek 1998). This is the reason that lab activities are so prevalent in the science classroom. They have also been proven in many studies to increase student achievement of science subjects and create a more positive attitude toward science (Jelinek 1998; Freedman 2001; Ertepinar & Geban 1996).

However, in examining lab instruction closer, much improvement can be made. Many students remain unengaged and simply put on “display” behavior for teachers according to the assumed goals of the lab while carrying on incidental chats with peers (Jimenez-Aleixandre & Diaz de Bustamante 1997). Even students who are on task are often able to perform a lab in the correct steps without ever having what Almekinders,

Thijs, & Lubben (1998) call “procedural understanding.” By this term is meant students understand the scientific reason for each step taken in a procedure. Many students only have what they call “procedural knowledge,” or understanding of how to do the lab without understanding the scientific reasoning behind it.

To fix these problems, many researchers have turned to lab preparation techniques. At the college level, science students who completed lab preparation guides were found to have a more positive attitude toward science and higher achievement of scientific knowledge (Johnstone & Watt 1998; Kirk & Layman 1996). Further, lab preparation was found to help post-secondary science students reduce the “noise” of a lab (extraneous issues that distract from the lab’s objective, such as using a new apparatus or difficult measurements) so that they could discern the “signal,” or the main learning objective of the lab (Rollnick, Zwane, Staskun, Lotz & Green 2001).

In many of the studies described above, lab preparation is done outside of the classroom. This is because many of the studies are college-level studies and traditionally, lab preparation is done outside of valuable lab time. Research, however, has not agreed on whether homework is an effective tool for achievement in grade-school. An exhaustive study of homework over a large population of students (elementary to high school) in the United States found improvements in achievement from homework increase as students get older (Cooper & Valentine 2001). At the high school level, Cooper & Valentine found that students doing homework assignments scored two-thirds of a standard deviation higher than those who were not doing homework on an achievement test. It is suspected that this is because by the time that students reach secondary school, they have learned study skills and are more self-motivated than younger students. However, Zimmerman (1998) found that as many as 25% of high school seniors report not studying at all outside of school while many more report that they do school work for less than one hour per day.

This study, then, seeks to find whether lab preparation can be assigned as homework and be effective for student achievement in understanding and affect toward science in a high school biology classroom, and specifically, for a lab contained within an animal behavior unit. Further, in the case that lab preparation is not effective as a

homework assignment, this study will also compare two different modes of in-class lab preparation for the same animal behavior lab.

Methods

Eighty-six students in three intact honors biology classes in a central North Carolina public school were studied. Each class was randomly assigned a different mode of lab preparation to complete before the completion of a termite behavior lab, an affective survey, and an objective quiz (See Figure 1).

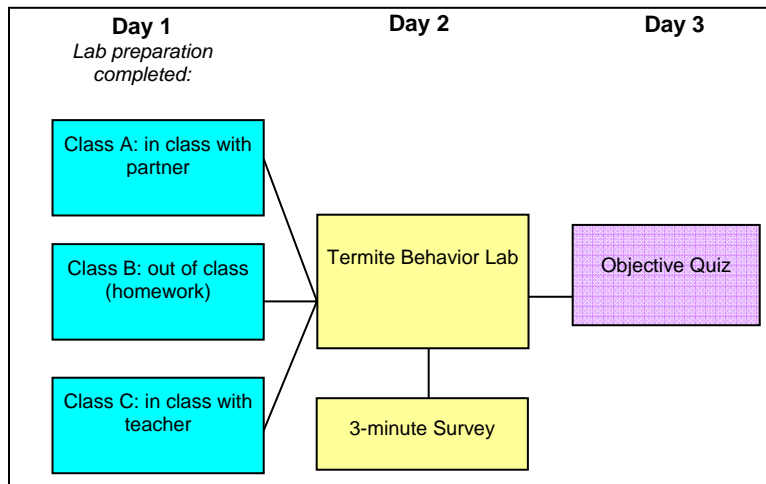


Figure 1. Study Design.

The lab preparation was designed to take approximately 25 minutes to complete. Its purpose was to require students to read the lab instructions before the lab, remind students of animal behavior concepts they had already learned, think about how they could apply those concepts to the lab, and design the steps to use in the lab. Students in Class A completed this during class the day before the lab with a partner. Class B completed their lab preparation as a homework assignment. Class C completed their lab preparation in a class discussion led by the teacher.

All students then participated in the same termite behavior lab. They were required to design a procedure to test the behavior of termites in response to different ink pens. The lab lasted 45 minutes and during the last three minutes of class, students took an affective survey.

The survey contained eight Likert-type statements, to which students had to respond on a scale from “strongly agree” to “strongly disagree.” The purpose of the

questions was to determine student feelings toward the lab preparation, the lab activity, their own understanding of the lab preparation and the lab activity, and the usefulness of the lab preparation. One week later, two students from each class were interviewed.

Results

Average quiz scores were statistically compared. It was found that average quiz scores were significantly different between classes (sig.=0.027, $\alpha=0.05$). Class B averaged the highest, followed by Class A and Class C. Table 1 below summarizes the numerical data found in this study.

Table 1. A comparison of average quiz and affective scores with the percent completion of lab preparation for each class.

	Class A	Class B	Class C
Average Quiz Score (out of 100)	68.3	76.9	64.8
Average Affective Score (40=most positive)	29.6	30.1	29.5
% Completed Lab Preparation	100	44.8	75.9

There was no significant difference between the three classes' affective scores. No significant correlation was found between quiz scores, affective scores, and percent completed.

Conclusions

The percent completion of the laboratory preparation by each class was found to be significantly different. These different percentages have several possible causes. Each class was only given 25 minutes to complete their laboratory preparation sheet. While for students in Class A, this was ample time to complete it with a partner (as evidenced by 100% of students attempting every question), students interviewed from Class C reported that they did not have enough time to finish writing down everything that was said in the discussion. Evidence of this such as incomplete and incoherent thoughts was observed in many of Class C's laboratory preparation sheets.

More than half of the students in Class B did not complete their laboratory preparation sheet. This is consistent with Zimmerman's (1998) finding that many students report doing less than one hour of homework per night and overshoots his

estimate of 25% who do not complete any homework. One of the possible causes of this was rumor that the laboratory preparation did not count for a grade. Evidence of this was observed in Class B on the lab day before the laboratory preparation sheets were collected. When students discovered that they were to be collected, they scrambled to fill in any answer that they knew. One student even wrote a note to the teacher at the top that said "Sorry-forgot." Students in Class B, like all other students in this study, were honors students. Many Biology I Honors students in the school studied are on an advanced track, meaning that their schedules are full of extra homework and projects, in addition to the after-school activities that they take part in to build their résumés for college applications. For this reason, many students are likely to prioritize their time spent after school, perhaps less than one hour (Zimmerman 1998), on those assignments which they know will count toward their class grades.

The percentage of students that completed the lab preparation does not correlate to the mean quiz score of each class. This means that there was no observable pattern between student achievement of understanding the *Termite Behavior Activity* and completion of the laboratory preparation sheet.

This could be caused, again, by several factors. The prior knowledge of each class was not accounted for before instruction and the laboratory took place. Therefore, there may be actual achievement differences between each class of students caused by chance, even though students were placed randomly in their class before the study began.

The implications of this study in the biology classroom are important. In North Carolina public schools, there is currently an emphasis on following the North Carolina Standard Course of Study and raising End of Course test scores to meet the standards set in the recent No Child Left Behind Act. Teachers are becoming increasingly pressured to spend every moment in the classroom on quality instruction directed toward state objectives. To improve the quality of lab activities and instruction time in biology, then, lab preparation may not be necessary for this specific lab (termite behavior).

However, it may be good to note that student affect for the lab activity and the lab preparation was overall very positive. Success and drop-out rates in science later in students' course work and on through college have been attributed to experiences in science early in student academic careers (Kirk & Layman 1996). Since this is the first

experience that many students have had in an upper-level science course, it may be important to emphasize teaching while maintaining a positive student affect for biology so that students will not be turned off to it later in life. More research should be done to determine whether different modes of lab preparation for other high school biology labs and for a wider range of students have an effect on student understanding of and affect for the concept being studied.

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The Efficacy of Strategies to Reveal and Address High School Chemistry Students Preconceptions

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December 2006

Introduction

This study's main focus is gaining understanding of students preconceptions about topics covered in high school chemistry. Also, the study will focus on the effect of targeted lesson plans on specific misunderstandings. Application of specific lesson plans will take place over a two week period. Educators are given the challenge of dealing with student's preconceptions for each topic. Student preconceptions have been developing since early childhood. Preconceptions can be influenced by personal and or sensory motor experiences.

Literature Review

Voska and Heikkinen focus on identifying and quantifying conceptions chemistry students have while solving equilibrium problems. Also the study shows that students can get questions right even if they don't know why.

Kikas completed a study that does a very good job of defining how misconceptions develop. Overall the teachers held similar misconceptions and roughly half actually had the misconceptions.

The next study by Novak addresses the idea of meaningful learning. Students can learn the material but do they learn it correctly and for the right reasons?

A study completed by Sanger and Greenbowe focus on electrochemistry. Misconceptions were obtained through structured interviews and testing.

Piquette and Heikkinen focus on applying literature based teaching strategies to see how performance is effected.

Orvis and Orvis use the example of achieving this interaction through a paper wad activity. If teachers realize the misconceptions that their students have then they can plan their lessons accordingly.

Nieswandt focuses on the idea that students previous science classes and every day experiences contribute to most misconceptions

Palmer states that students commonly have alternative understandings about chemistry concepts.

The next study by Solomonidou and Stavridou focuses on development of students conceptual understanding. The results displayed conceptual development for most students.

Methodology

Participants. There were two separate classes for total of 58 students, taught by the same teacher. The high school is located in central North Carolina.

Approval Process. The research process began when Wake Forest IRB and the central North Carolina school approvals were granted. CITI training was completed.

Instrument. The misconceptions of the students were revealed through assessments, before and after each unit, written by the classroom teacher.

Design. This study involved two classes with a total of fifty eight students. Two units were targeted to reveal and address the preconceptions of students, see Figure 2.

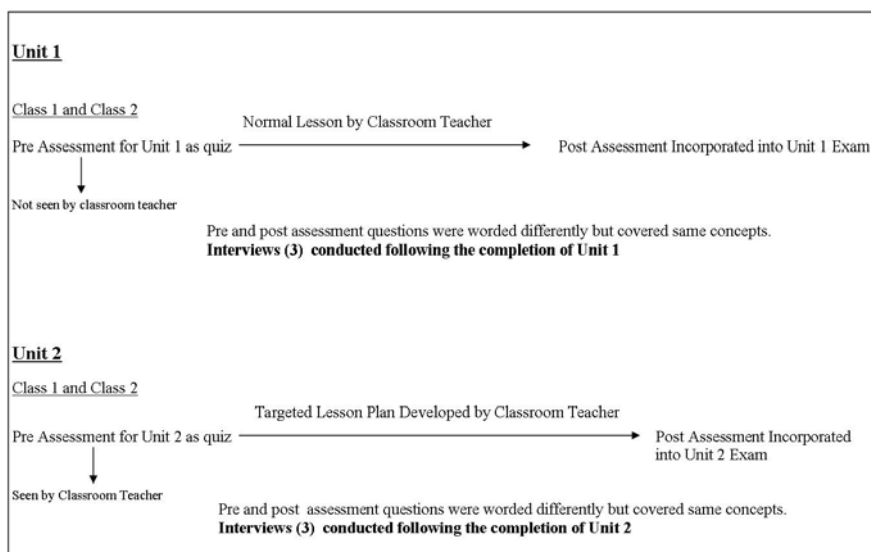


Figure 2. Summary of Design

Procedures. Each unit was taught by the same classroom teacher. The first unit consisted of the classroom teachers' original lesson plan. The second unit consisted of a targeted lesson plan.

Data Analysis. During the interview students were asked to explain their responses to a given question from the knowledge assessment.

Results

Assessment responses were scored on a scale of 0 to 2. Scientific understanding received a score of 2, partial scientific understanding received a score of 1, false preconception received a score of 0, and no response received a score of 0.

Figure 16 and 17 show the change in scientific understanding.

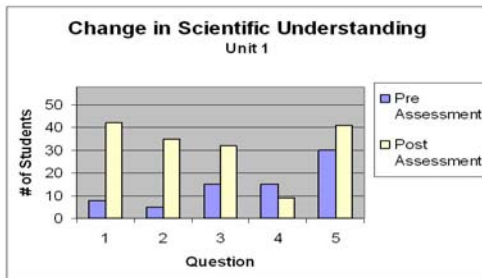


Figure 16. Scientific Understanding from Pre to Post-assessment

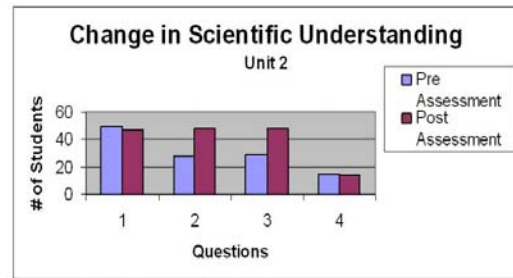


Figure 17. Scientific Understanding from Pre to Post-assessment

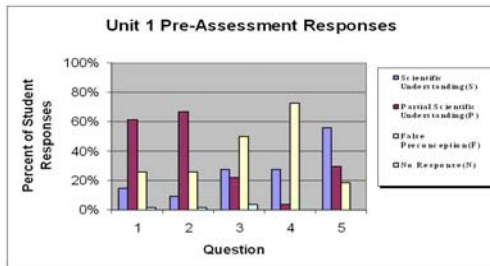


Figure 10. Unit 1 Pre-Assessment Averages for Individual Questions

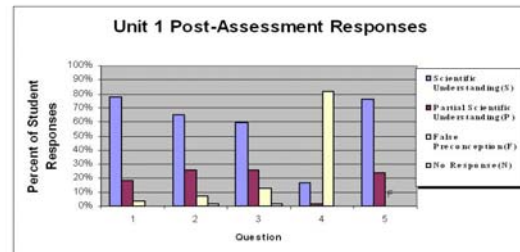


Figure 11. Unit 1 Post-Assessment Averages for Individual Questions

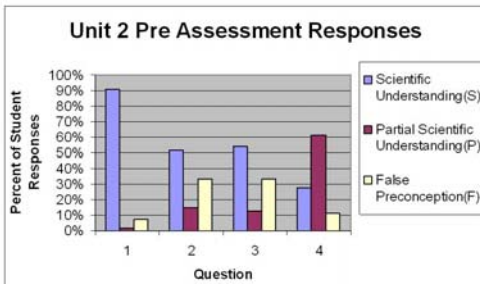


Figure 12. Unit 2 Pre Assessment Averages for Individual Questions

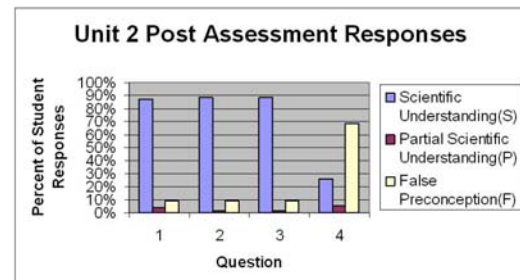


Figure 13. Unit 2 Post Assessment Averages for Individual Questions

Common Misconceptions: Unit 1 and Unit 2

Table 1. Common Misconceptions Unit 1

<p>Hot vs Cold Water is only hot or cold if it feels hot to humans. Hot always means more energy Hot means releasing energy Relates only to heat Hot is when bubbles are formed Cold is when there are no bubbles formed Hot is liquid Cold is solid Cold is only when something is less than or equal to 36 degrees F. Hot is when water is cloudy Cold is when water is clear Hot is only when water is boiling Heat has to be applied to be hot</p> <p>Pressure Energy particles trapped in a space Amount of matter filling a space Nothing goes in and nothing comes out Ball is held in place by air rather than solid structure If there is no pressure then it can not burst Something is pressing against something else Something is being contained inside Hard things have pressure No pressure means less air</p> <p>Condensation The cold from the milk condensates and forms water Water particles are small and go through the glass The air warms the glass The sweat is formed because the milk is colder than the glass The glass freezes and as it melts water forms The milk gives off water The milk perspires Water seeps through the glass Water molecules in the air are attracted to the heat being given off by the glass The milk sweats and the water is from precipitation</p> <p>Melting Ice When the ice melts more water is formed When the ice melts it will take up the same amount of space The ice is already part of the water The water from the ice will be dissolved Ice is the same amount of water in a different form When the ice melts the water expands because ice is more dense than liquid water Ice and liquid water have the same density Ice has the same mass as liquid water</p> <p>Solid vs Gas Phase There are more molecules in the gas phase Molecules in a solid do not move so they stay in the same place Molecules in a solid stay together Solids are frozen Solids have less heat and do not move as much</p>
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Table 2. Common Misconceptions Unit 2

<p>Lung Capacity Pressure has no effect on lung capacity It all depends on the amount of oxygen Lungs are under more pressure at the surface than under the water</p> <p>Volume with change in Temperature Temperature does not effect volume Water molecules freeze and increase the volume Volume will remain constant Molecules just slow down</p> <p>Gas Diffusion Heavy gases move faster Lighter gases move slower Heavy gas always sinks Light gas always goes up Light gas has more pressure</p> <p>Partial Pressure Heavy gas exerts more pressure due to size It all has to do with force Lighter gases are blocked by heavy gases so they exert no pressure Lighter gases exert less force and pressure</p>
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Conclusion

Success in science focuses on the ability of a person to undergo metacognition. Metacognition is the ability to make sense of what has been taught and then apply the knowledge for deeper understanding.

The results show that using concrete content specific examples are most effective in student understanding and metacognition. Simply, changing these words into phrases that the students can relate to had the biggest impact on addressing students' preconceptions, as portrayed during the interviews.

In comparing each unit it can be concluded that the classroom teacher had an effective lesson in teaching the concepts.

If a student is not engaged in the lesson then learning is much more difficult. Metacognition can be enhanced through inquiry in which the students determine if their current understanding is scientific.

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The Effect of the Outdoor Environment on Knowledge Acquisition, Retention and Attitudes in a Biology Class

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Introduction

Science education is considered essential for today's students, and is frequently touted as in need of improvement (AAAS, 2006). One suggestion which has been made to improve science education is to conduct it in an authentic setting (Project 2061, 1993). For most biology topics, the outdoor environment is the authentic setting; this is where most of the organisms occur. However, the outdoor setting is an under-utilized instructional environment for biology education. When asked why they do not use the outdoor environment, teachers cite concerns of management issues, lack of planning time and assistants, and issues with school bureaucracy, including funding and restrictions (Dissinger, 1984; Hall & Wright, 1980).

Review of Literature

Investigating biological topics in an authentic environment may increase students' memory and understanding of concepts. Studies have found that field trips and other out-of-school learning experiences are able to increase student cognition, higher order thinking, and long-term retention of information, as well as resulting in more positive attitudes toward science (Basile & Copley, 1997; Cronin-Jones, 2000; Howie, 1974; Knapp, 2000; Mackenzie & White, 1982; Nichols, 1989; Orion & Hofstein, 1994; Roth & Bowen, 1995; Winn et al., 2006; 1993). Recently, the use of school grounds for biology investigations has become popular (Raver, 1999), as it is convenient and accessible. In light of this trend, this study investigated the use of school grounds in a high school biology class. Effects on knowledge acquisition, retention, and student affect were examined.

Methods

This study took place at a central North Carolina high school. The participants in this study were students in two intact honors high school biology classes, taught by the same teacher. A total of fifty-two students participated. Identical pre, post, and retention test were administered to assess learning, and an attitude questionnaire was administered to assess student affect. Both classes completed a pre-test to assess prior knowledge. One week later, the classes completed an activity about camouflage. In this activity, students worked in groups to create an animal that is camouflaged with a specific environment. The indoor class's environment was the classroom; while the outdoor class made their animals to blend with a strip of old field bordering the school grounds. The outdoor class was allowed to use natural materials when creating the animals, while the indoor class could only use the provided materials and materials found in the classroom. Five days after the activity, students completed an attitude questionnaire and a post-test to assess their knowledge of camouflage. One month after the post-test, students completed an identical test, to assess retention rates.

Analysis

Test Scores

The post-test scores, adjusted by ANCOVA to account for prior knowledge (pre-test scores), showed that the treatment groups were not significantly different, with a significance of .361 ($\alpha=.05$). Indoor post-test scores ranged from 3-8 with a mean of 5.607 while outdoor post-test scores ranged from 2-9 with a mean of 5.149 (see Figure 2). The indoor class's scores showed more improvement from initial pre-test scores than the outdoor class's scores.

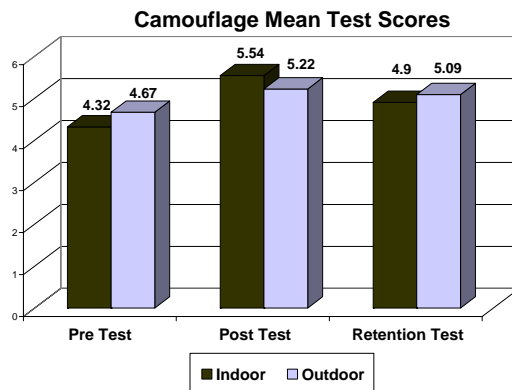


Figure 2. Camouflage question mean scores

Mean scores on the camouflage questions were 4.90 for the indoor class and 5.09 for the outdoor class. Retention test scores were analyzed two ways using ANCOVA; using pre-test scores as the covariate, and using both pre-test scores and post-test scores as covariates. With both ways, there was no significant difference between the classes. Interesting, there was less of a drop from post-test scores to retention test scores in the outdoor class than in the indoor class. When this difference between post-test and retention test scores was analyzed using an Independent t-test, no significant differences were found between the groups.

Questionnaire results

Questionnaire results were analyzed both quantitatively and qualitatively. The Likert-style responses were scored numerically; strongly agree was given a score of 5, agree was given a score of 4, neutral was 3, disagree was 2, and strongly disagree was 1. The numerical scores for each item on the questionnaires for the two classes were compared using t-tests of Independence; to determine if the treatment had an effect on attitude, see Figure 3. There were no significant differences between the means for any of the questions. However, the means for the outdoor class were higher than the indoor

5 Strongly Agree	4 Agree	3 Neutral	2 Disagree	1 Strongly Disagree	Mean Scores	
					Indoor	Outdoor
1) I enjoyed the activity about camouflage in Biology class.					4.44	4.46
2) I enjoy learning about Biology.					3.56	3.63
3) I could use what I learn in Biology class at some point in my life.					3.24	3.54
4) I like spending time outdoors.					3.92	4.25

Fig. 3. Questionnaire results: A significant (.006, alpha=.05) correlation was found between responses to item two and item three.

class for each question. A significant correlation, with a Pearson’s correlation value of .387, was found between responses to item two and item three, regarding attitudes toward Biology class and the relevance of information in Biology class.

For items two and four, students were asked to elaborate on their responses. These responses were analyzed qualitatively. On both items, there was little difference between the classes in student responses. On item two, 31 students reported positive attitudes, 13 were neutral, and 6 had negative attitudes. For students who liked Biology,

the most common reason given was that it was interesting to see how living things worked; eighteen students responded with this answer. Others simply said it was interesting and that it was fun. For students who did not like Biology or mentioned negative characteristics in neutral responses, the most common reason given was that it was boring. For item four (see Figure 3), 41 students showed positive attitudes, 5 showed neutral attitudes, and 3 showed negative attitudes. Positive responses fell into three major categories; recreation (things students do outside, i.e. hiking, sports), sensations (i.e. fresh air, beauty), and state of mind (i.e. more space/less feeling ‘cooped up’, calming/peaceful). The most common response for disliking the outdoors was bugs.

Discussion and Conclusions

While there was not a significant difference between the classes on post-test scores, the indoor class’s scores increased more between the pre-test and the post-test than the outdoor classes. This difference may be due in part to how the activity was conducted and student behavior during the activities. Most students in the outdoor class did not utilize natural materials when constructing their animals as they were supposed to, and unlike the indoor class, did not look at the habitat they were making the animal to be camouflaged with before making the animals. These aspects of the activity were included to stress the concept that animals are camouflaged with a specific environment, and missing out on this concept could have resulted in lower learning. Students in the outdoor class were also more off-task during the post-activity discussion. This may have been due to the “novel field trip phenomenon”, in which students are so stimulated in a novel environment that they exhibit off-task behavior (Falk & Balling, 1979).

The outdoor class’s higher retention scores are consistent with the literature. Higher long-term retention has been associated with outdoor learning. Lisowski & Disinger (1991), Mackenzie & White (1982) and Wise (1974) all found higher retention rates for students learning in an outdoor environment. While novelty may result in off-task behavior, the different physical environment may cause students to remember the experience better.

The outdoor setting is an underutilized instructional environment, with many potential benefits. While this study did not find significant differences between classes

conducting an activity indoors versus outdoors for knowledge acquisition, retention and student attitudes, there was a trend for more positive student attitudes and higher retention rates for the outdoor class. The lack of a difference between the classes is also instructive; this study indicates that conducting activities outside will not be detrimental to learning. Additional results from this study show that students in this study overwhelmingly enjoyed the outdoors, and had tepid opinions about biology class. Opinions about biology class were also correlated with opinions on the relevance of biology to students' lives. These results could be helpful for teachers when designing lessons. Attitudes towards biology class could be improved by stressing the relevance of biology information with concrete examples, and lessons which incorporate the outdoors will be appreciated by students who greatly enjoy the outdoors. Given the limitations of this study, more research is needed involving longer-term student involvement with the outdoor environment to help determine the efficacy of using the outdoor setting in biology education.

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A Study of the Effect of Calculator Use on Computation Skills of High School Mathematics Students

by

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Introduction

Calculators are an integral part of the high school mathematics classroom, but a current topic of concern among educators is the effect of prevalent calculator use on students' computation abilities. State and national standards stress the importance of using technology to enhance students' understanding of content concepts. Calculators have changed the way mathematics is taught and have made it possible for teachers to introduce advanced concepts that would not be feasible with only hand-calculation. The benefits of this technology are clear, but there is debate about possible disadvantages.

The Curriculum Focal Points for Prekindergarten through Grade 8 Mathematics present the view that certain skills form a foundation for reaching the ultimate goal of conceptual understanding and problem solving skill (NCTM, 2006). These foundation skills include basic operations on all rational numbers. The National Council of Teachers of Mathematics (2000) states in the Technology Principle that technology cannot be a replacement for understanding. This principle states that teachers must make decisions about when and how to use technology to best enhance students' mathematical thinking.

Review of Literature

As research has accumulated regarding the effects of calculator use it is necessary to examine current trends in classroom practice. In Milou's (1999) study of teachers' technology perceptions, he found that most algebra II teachers were using graphing calculators in class, but less than half of algebra I teachers were utilizing this technology. His study also asked about calculator restrictions and curriculum changes due to the availability of graphing calculators. The responses were varied, indicating that there was still debate concerning appropriate calculator use.

The debate is most concerned with how to teach students to be effective technology users. Ball and Stacey (2005) described the ideal technology user by saying: Our ideal user... has a strong conceptual understanding... has sufficiently strong basic algebraic manipulation skills to solve simple problems quickly either mentally or by using paper-and-pencil techniques... routinely considers whether it is or is not efficient to use technology to solve a problem, not reaching for the technology when a little thought can quickly give an answer. (p. 4)

In order to achieve this goal, it is necessary to examine the effects of calculator use.

Many studies have compared a calculator treatment group to a non-calculator control group. Hembree and Dessart (1986) compared seventy-nine research studies across a variety of dimensions. Their findings indicate that with the exception of Grade 4, students maintain or improve their paper-and-pencil skills when using calculators within a traditional curriculum and may improve their problem solving skills. In 1992, Hembree and Dessart examined additional studies and concluded that calculators have continued to provide an advantage for computation and the positive effect on problem solving has increased. Similarly, Ellington (2003) found that operational skills and method selection for problem solving improved for calculator users even if calculators were not allowed on the tests. When calculators were also included for assessment, operational skills, computational skills, concept understanding, and problem solving skills improved. Negative effects were not found for any of the components of achievement.

Teachers who support the use of calculators in class argue that decreased focus on computation allows more time for problem solving. In a study examining student solution strategies in the presence of graphing calculators, researchers found that the use of the graphing calculator led students to use more graphic solution strategies. Since there was no observable decline in other strategies, researchers concluded that the graphing calculator allowed students to answer more questions by drawing from a larger body of possible problem solving methods (Harskamp, Suhre, & Van Streun, 2000).

Even with the extensive amount of literature supporting the use of calculators, there are still concerns about disadvantages. DeVaney (1996) found that frequent use of technology was related to lower computation achievement. As calculator use has changed over the past few decades it is particularly interesting to consider replication

studies. In 1998, Glasgow and Reys replicated a study of calculator authority that was conducted in 1980 by Reys, Bestgen, Rybolt, and Wyatt. Each participant was asked to estimate the answer of a simple computation problem, use a calculator to find the answer, and then evaluate their estimate. The calculator was programmed to provide incorrect answers. In the 1980 study, 64% of participants questioned the calculator, while only 28% of participants questioned the calculator in 1998. This study implies that students attributed more authority to the calculator answer than their mental computation skills.

As the literature shows, calculator use is a topic of debate in many realms of education. As teachers adapt their classrooms to the ongoing changes related to this technology, it is important to consider the advantages and disadvantages.

The purpose of this study was to examine the relationship between frequent calculator use and student computation abilities. The study investigated how often students used a calculator for basic computations, like addition, subtraction, multiplication, and division of rational numbers, and how well students could complete similar problems without a calculator.

Methodology

A correlational study was conducted to explore the relationship between frequent calculator use and computation ability in high school mathematics students. The sample included all regular track Algebra II students at a suburban high school in central North Carolina, resulting in 99 participants. The students were purposely chosen from a regular track to examine the relationship between calculator use and computation among students of average mathematics ability.

A ten question non-calculator test was developed for this study to test students' computation abilities. The problems required basic operations with rational numbers. A similar ten question calculator test was used to gauge the frequency and type of student calculator use. Students were asked to complete each problem and indicate whether they did not use a calculator, used a calculator for checking only, or used a calculator to solve the problem.

Each student drew a card labeled with a number between 1 and 180. This number was their identification number for labeling study materials. The ID number was the only identifying information on the tests, allowing all data to remain anonymous. Students

were given the non-calculator test followed by the calculator test, and allowed ten minutes to complete each test.

After students completed both instruments, the tests were scored. The non-calculator tests were assigned a value from 0 to 10 indicating the number of questions answered correctly. The calculator tests were each assigned two values from 0 to 10. The first value indicated the number of questions the student solved by hand. This manual computation preference was found by counting the number of times the student marked either of the first two calculator use categories, “Did not use a calculator” and “Used a calculator for checking only.” The second value indicated the number of questions the student solved with a calculator. This calculator computation preference was found by counting the number of times the student marked the third calculator use category, “Used a calculator to solve the problem.” The non-calculator test scores were correlated with the calculator computation preferences using SPSS.

Results and Conclusions

The tests were analyzed for common trends in computation ability and calculator use. Ninety-nine students completed both tests, but seven test sets were discarded because the student did not follow the directions. The remaining ninety-two test pairs were scored and descriptive summary statistics are provided in Table 1. On the non-calculator test, the score indicated the number of problems completed correctly out of ten. On the calculator test, the preferences indicated the number of problems the student completed manually and the number of problems the student completed with a calculator.

Table 1

Descriptive Statistics for Non-Calculator and Calculator Tests

	Mean	Standard Deviation
Number Correct on Non-Calculator Test	7.12	1.663
Student Option A: Manual Computation Preference on Calculator Test	5.22	2.897
Student Option B: Calculator Computation Preference on Calculator Test	4.78	2.897

* $n = 92$

The means of the computation preferences indicated that when students were given the option of using a calculator for operations with rational numbers they chose to complete the problems by hand slightly more often than they chose to use a calculator.

Using a Pearson correlation, the non-calculator test scores were correlated with the calculator computation preferences. The correlation coefficient and significance results are summarized in Table 2.

Table 2

Correlation Between Non-Calculator Scores and Calculator Computation Preferences

		Calculator Computation Preference
Non-Calculator Score	Pearson Correlation	-0.380
	Sig. (2-tailed)	0.000

* n= 92

The correlation between the non-calculator test scores and the calculator computation preferences was statistically significant at the 0.01 significance level with a correlation coefficient of -0.380, indicating that students who chose to complete more of the problems on the calculator test with a calculator tended to answer fewer questions correctly on the non-calculator test. These results indicate that there was a statistically significant relationship between frequent calculator use and student computation abilities. Specifically, students who used a calculator more frequently tended to score lower on a test of computation skills than students who did not use a calculator as often.

The NCTM Standards (2000) state that students should, “develop fluency in operations with real numbers... using mental computation or paper-and-pencil calculations for simple cases and technology for more complicated cases” (p. 290). The calculator preferences in this study indicate that if students have the option of using a calculator on simple cases, they may use the technology instead of practicing paper-and-pencil skills and may come to rely on calculators. It is not necessary to ban technology, but students must be taught how to use technology effectively so they develop computation skills and experience the benefits of calculator use. As Ball and Stacey (2005) described, effective calculator users have sufficient manipulation skills to complete simple problems without a calculator, use a calculator when it is efficient, and can use technology for exploration. As evidenced by calculator use during the study, some students used calculators effectively. These students used the calculator when it could save time, but they did not use the calculator when manual computations were more efficient. Other students in the study did not exhibit this skill and used the calculator on problems that could be more efficiently completed without technology.

In order to promote effective calculator use, teachers must model this use. When basic computation skills are being taught and tested, students should not be allowed to use a calculator to ensure that they understand the concepts and practice the computations. As the course progresses to complex topics, students should be allowed to use a calculator because of the advantages for graphic understanding and problem solving evidenced in other studies (e.g., Ellington, 2003; Harskamp, Suhre, & Van Streun, 2000; Hembree & Dessart, 1986), but the teacher should encourage students to assess the calculator answer based on the understanding they developed with basic computations.

Each school will have to determine their own calculator policy, but as they consider the options, it is important to remember that this study indicated a significant relationship between frequent calculator use and lower manual computation skills. In order to meet the expectations of the NCTM Standards (2000) and ensure that students maintain proficiency with manual computation, classroom procedures must encourage students to practice problems involving basic operations without using a calculator.

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Talk Time: Discussion as Discourse in Social Studies Classrooms

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Introduction

Differences in teaching methods can have different effects on students' levels of comprehension and learning throughout any discipline. In social studies classes, the common instructional method utilizes a lecture format. An alternative to this lecture format is one where there is some interaction between teacher and student, as well as between students. The two general categories for interactions in classrooms are recitation and discussion. Recitation is defined as when teachers ask questions looking for specific information and students answer (Wilén, 2004). There is no common definition of the second category, discussion (Goldenberg, 1992; Preskill, 1997). While ultimately there are different types of discussion, the basic definition for the purposes of this study is "a back-and-forth conversation involving students and teachers at a high cognitive level about a specific subject" (Larson, 1996, p. 1). This study will categorize and quantify the types of discourse, particularly as it relates to discussion, used in high school social studies classrooms in a medium-sized urban community in the Southeastern United States.

Literature Review

Research has shown that discussion has many positive benefits on students when used as a method of instruction. Some benefits include increases in reading comprehension, higher order thinking skills (according to Bloom's Taxonomy), conflict resolution skills, communication skills, and critical thinking skills (Polite & Adams, 1996; Pomerantz, 1998). In addition, research shows that discussions allow students to incorporate and construct new knowledge and skills, as well as build their own ideas around a specific context (Nystrand, Gamoran & Carbonaro, 1998; Pomerantz, 1998). They allow students to manipulate material, which requires a deeper and more thoughtful understanding, rather than simply repeating information.

While research states the value of using discussions in classrooms, there are many factors that influence what types of discourse to engage students. Larson (2000) engaged in research to discover what factors influenced (both positively and negatively) teachers' use of discussion within the classroom. Five factors were found to have influence: "student diversity, lesson objectives, age and maturity of students, sense of community in the classroom, and the interest level of students" (Larson, 2000, p.176). Alvermann, O'Brien, & Dillon (1990) found that there is a correlation between the purpose of the lesson and the type of discussion that emerged. The study found that most discussions fell into one of the first two categories of lecture and recitation (Alvermann et al., 1990). Teachers use a particular discourse method it is the most effective method for helping students achieve the objective for the day. Sometimes instructors decide discussion is best suited and sometimes not.

When discussions are used as a method of classroom instruction, there are other benefits that are linked to student performance. Research indicates there is strong support for an association between student participation, in general, and achievement (Voelkl, 1995). More specifically, Nystrand et al. (1998) found that student academic success was often higher in classrooms that promote and utilize effective discussions than in those that use the lecture method.

It is clear that prior research demonstrates the importance of engaging students in classroom discussions as a method of instruction. However, research on the nature of discussions has indicated when it does occur, it generally resembles recitation rather than a mutual dialogue (Larson, 1996; Parker, 2005). One study indicated that student talk and discussion were present in the classroom, but only during 18% of the time, which is nowhere near dominant (Parker, 2005). This indicates students in these classes participate less in discussions, an important method of facilitating student engagement and a deeper understanding of the material.

Methodology

This study attempted to indicate the types of instruction in ten classrooms in one Southeastern state, categorize the types of interactions that occurred between teachers and students, and indicate the frequency of these interactions. Interactions were categorized based on the six conceptions of discussion used by Larson (1996) in his grounded theory

study on “Social Studies Teachers’ Conceptions of Discussion.” Six categories emerged from his research, but only the first four were used in this study. These categories are discussion as: Recitation; as a Teacher-Directed Conversation; as an Open-Ended Conversation; and as posing Challenging Questions (Larson, 1996, p.6).

An email invitation was sent to all social studies teachers in the county, to which approximately eighteen replied. Of those eighteen, a sample of ten teachers was selected purposively in order to gain a wide variety of class types, levels, and schools. Each teacher was observed approximately four hours, with an effort to see each class more than once. Each teacher gave his/her informed consent before observations began.

Data was collected using two methods. The primary data collection tool was the Flanders Interaction Analysis Chart (McNergney & Carrier, 1981). The Flanders method helped the researcher to categorize the type of interaction which took place, according to the Larson (1996) categories previously indicated. Data was collected in five minute intervals and interactions were recorded approximately every three seconds until the five minutes were completed. This system was used as many times as was appropriate in a given class session. The interactions were recorded according to whether they involved Teacher Indirect Influence (accepts feelings, praises/encourages, accepts/uses student ideas, asks questions), Teacher Direct Influence (lecture, give directions, criticize/justify authority) or Student Talk (response, initiation, silence/confusion).

The secondary tool was a seating chart drawn according to the placement of the students around the room. The seating chart was used to keep track of which students contributed during what time of the class period. In addition, the chart tracked how frequently each student contributed in order to indicate the nature of the interactions which took place. On this chart, the researcher recorded the activities which occurred during the class period, the times they each took place, and which student contribution numbers fell into the given time frame. In addition, the researcher made any handwritten notes deemed necessary, as the need arose.

Data Analysis

The researcher observed 32 class periods over the course of two weeks. Seven teachers were observed throughout five high schools, for varying lengths of time from three to nine periods each. Four World History classes, 14 Civics and Economics classes,

12 U.S. History classes, and two Geography classes were observed. The lack of World History observations was due to a lack of response by teachers of those subjects. Of all the classes observed, three were Advanced Placement (AP), eleven were Honors, sixteen were Standard, and two were mixed levels classes.

Five major findings appeared throughout the collection and analysis of the data. The first, and most significant, finding is that very few substantial interactions between teacher and students take place within the classroom. The total interaction time recorded for all seven teachers amounts to approximately 222.3 minutes out of a total of 1536 minutes, or 14.5% of all observed time. There were no significant interactions in ten out of the 32 class sessions observed. For the broad categories of the noted interactions across all classrooms observed, Student Talk consisted of 26.8%, Teacher Indirect Influence consisted of 16.4%, Teacher Direct Influence consisted of 45.4%, Silence/Confusion consisted of 11.4%, and Lecture (part of Teacher Direct Influence) consisted of 39.4%. During these noted interactions, lecture represented 37.2% of the time in Standard classes, 42.3% in Honors classes, and only 26.2% in AP classes. The AP statistic may not be entirely accurate, given that only three AP classes were observed.

The second major finding of this research indicates that when significant interactions do occur in the classroom, they most often fall into one of the first two Discussion Categories: Recitation and Teacher-Directed Conversation. Among the classes observed, there were a total of seven interactions in the Recitation Category, varying from two – seven minutes in length. There were nine interactions in the Teacher-Directed Conversation Category, varying from two – eight minutes in length. One Open-Ended Conversation of three minutes took place. Lastly, two interactions in the Challenging Questions Category occurred, one lasting 14 minutes, the other lasting 34 minutes. These numbers indicate a wide dominance of the first two categories established by Larson (1996), in addition to a lack of interactions overall.

The third finding indicates that when an interaction is started, by either teacher or student, the teacher often dominates and turns it into a lecture. In the approximately 132 minutes of significant interaction noted by the researcher, this happened at least 43 times. There is also a consistent note from the researcher on 15 of the 32 (47%) of the class sessions observed. In addition, 37.2% of the interaction coding consists of lecture.

A fourth finding indicates that when there is interaction, or student talk, it is concentrated among a small percentage of the class. In the 22 classes where significant interaction occurred, an average 61% of the students made little (one) or no contribution. The class sizes ranged from eleven to 29, and the percentage of students with little or no talk ranged from 23% to 91%. When there is a wide dispersal of students who contribute to the class, it is because they are called on by the teacher to give an answer.

Discussion and Implications

The information found in the body of the research is not surprising, as it is consistent with previous research into the matter of discussions in the classroom. However, the researcher did not find many studies that examined the reasons behind the lack of use of discussion as an instructional method. A subsequent study to investigate these reasons could prove incredibly useful in greater attempts to overcome this obstacle.

The first finding that there are very few significant interactions in the classroom is disconcerting, as discussions have been shown to be important to student development (Polite & Adams, 1996; Pomerantz, 1998). Some of the lack of interaction may be due to alternative activities like individual work, group work, or presentations of projects. However, it is mostly because lecture is the method of choice for instructional purposes.

The second corresponds previous research attempts to collect classroom interaction data (Larson, 1996; Parker, 2005). As the interactions generally fall into these two categories, they do not further many of the skills potentially strengthened by the use of discussion. One limitation of this study associated with this topic is that it did not explore the nature of interactions within small groups. An area of importance for future research is to investigate how often students are being asked to grapple with the content in various ways, including group work.

The third finding leads to some noteworthy questions as to the reasons for teacher domination of instructional class time. When questions were posed or students showed interest about certain topics, the teacher was quick to respond and take control of the information or perspective being presented. Why do teachers feel the need to dominate or control interactions in the classroom? Why do teachers continuously employ lecture as the main method of instruction? These questions constitute potentially important prospects for further research into the matter.

One general clear possibility for future research is to expand upon and improve the methods of investigation utilized in this study. This research was very small and limited in its scope. Only a small area of the country was utilized, as well as a small percentage of teachers and class periods. Because of time restrictions, the observations occurred during a period of two weeks, not necessarily representing the common themes of the entire school year. The final, and perhaps most important, limitation of the study is that it does not take note of interactions that occur in small groups, or outside the frame of the entire class. The implications and limitations given, the study provides insight into the use of discussion in the classroom.

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Reader Response Criticism in the Secondary English Classroom

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Introduction

Analyzing literature for the sheer pleasure of witnessing intricacies of language, structure, and profound themes is a common practice for English teachers who became educators because of their love of literature. However, they may face incredible resistance if they expect or even ask their high school students to enter a text in such a way; students may need to explore it gradually before they experience any long-lasting feelings about its aesthetic qualities. The approach that “[asks] students to relate literature to themselves, their lives, and what else they have read” is called the reader response approach (Christenbury, 2000, p.128). The ways in which this approach is ignored, resisted, and often abused in secondary English classrooms is the subject of this study.

Review of Literature

In response to a lack of interest among students who have no desire to enter a text through New Criticism, historical background, or author background, researchers have begun to turn to reader response criticism, which they feel engages students and validates what they have to say about literature. In her book *Making the Journey: Being and Becoming a Teacher of English Language Arts*, Leila Christenbury (2000) writes that many teachers “discovered reader response out of [their] own failure to entice [their] students to celebrate what [they] perceived to be the great craft of literature” (p. 129).

Louise Rosenblatt (1968), who is considered the most influential defender of reader response, believed that literature should be taught as it relates to students’ lives because literature reflects society—the society of which they are a part on a daily basis and of which they will be a part exclusively when they enter life outside of school (p. 3). In *Literature as Exploration*, she remarks, “Any knowledge about man and society that schools can give him should be assimilated into the stream of his actual life,” which

asserts the point that literature *can* create benefits in real life and that “[t]eachers of literature have been too modest about their possible contribution to these demands” (p. 4).

Probst (1988), explaining the ideas of Rosenblatt, writes, “Meaning is the product of a transaction between active minds—it does not reside in the ink, to be ferreted out, unearthed, uncovered. Rather, it is created, formed, shaped, by readers in the act of reading, and thus it is *their* meaning” (p. 34). Students should be able to begin a discussion with whatever natural and initial reactions they have; only then can a class consideration of a work be the most productive, because the students will feel their opinions matter.

Milner and Milner (2003) cite reader response as the first step in experiencing literature. Since “all readers bring prior experience and knowledge of life and reading to any text,” this seems the logical first step (p. 105). Milner and Milner construct four steps, starting with the concrete (reader response) and moving toward the abstract (interpretive community, formal analysis, and critical synthesis). The stages can overlap, but each builds on the other and creates the potential to study literature more and more abstractly (p. 104). As Christenbury (2000) notes, “[A] reader response is not an invitation to,” among other things, “ignore completely what is in the text” or “read into the text facts that are clearly not present or not defensible” (p. 136).

In some cases, reader response has no chance to work; a teacher may resist it because he or she feels that the class should focus entirely on correct answers concerning literary elements. In other cases, students enter the classroom with no desire to engage in the lesson, so they do not respond, even when the topic is something to which the teacher feels they should relate. Probst (1988) writes about the former in “Dialogue with Text,” in which he observes a class that has natural and initial reactions to a text and attempts to share them with one another, but is combated by the teacher who continuously tries to steer the class away from their responses in order to focus on more abstract concepts. In his description, Probst reports that the teacher “sternly” (p. 33) asks the same question about character *four* times, unwilling to allow reader response as a launching pad toward more abstract ideas. As a result, the teacher faces a frustrated, unengaged class.

Methodology

This study is qualitative and designed to draw a generalization about how reader response is used (or not used) in the English classroom. The study involves four English teachers at a secondary school in the Winston-Salem/Forsyth County, North Carolina school district. Classes observed ranged from grades nine through twelve; the levels of the classes ranged from regular to Advanced Placement. Class size varied from eight to twenty-seven. Each teacher was observed a total of ten times, for a sum of forty observations. Each teacher was assigned a letter to identify him or her, as in “Teacher A,” “Teacher B,” etc. Discussions, questions, and teacher instructions involving literature were considered and placed in one of four categories to illustrate how reader response was used (or not used) in the classroom.

The first category, “reader response (formal definition) is present,” indicates that reader response was used. Students were allowed to share their natural and initial reactions, and the teacher used this method as a launching pad to further analysis, not as the only avenue of studying the literature. The second category, “abuse of reader response,” refers to situations in which teachers did not move beyond reader response.

Category three, “no reader response is present,” is split into two categories, depending on the reason it was not occurring: a) cases where students refused to respond to the teachers’ attempts to engage them with reader response and b) when the teacher did not use reader response and students did not attempt to use it. The fourth category, “teacher is resistant to reader response that is present,” describes instances where the class had natural and initial reactions and attempts to share them with one another, but the teacher combated such an endeavor in order to focus on more abstract concepts.

Throughout observations, the occurrences of situations in each category were tallied to create a generalization about how reader response was dealt with in secondary English classrooms and how the manners with which it was dealt affected student engagement.

For the purposes of this study, engagement was measured by observing the apparent attention levels of students as well as their apparent grasp of the concepts the teachers intended to cover during a particular class period. This included, of course, students’ level of participation during discussions. While observing, each class was given an engagement level using the table below:

Table 1

Levels of Engagement	
5- highly and consistently engaged	3- moderately and less consistently engaged
4.5	2.5
4- highly but less consistently engaged	2- sporadically engaged
3.5	1.5
1- not engaged	

A number was assigned to each individual class and is, subsequently, paired with the reader response category each class was given. In the end, the numbers assigned in all classes were averaged and placed alongside their corresponding category. This gave a picture of how each approach to reader response corresponded to student engagement, and if, in the classes considered in this study, reader response gained the highest level of student engagement—an idea shared among many educational researches.

Results

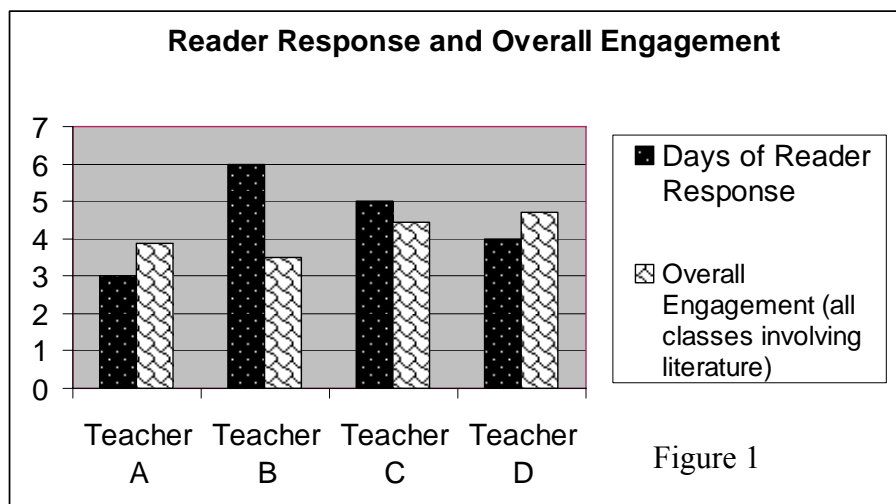
After completing the study and considering all classes that involved the discussion of literature, it was found that, out of 40 classes, 26 involved literary discussions. When these classes were placed in reader response categories, all fell into either Category one, “Reader Response (formal definition) is present” or Category 3b, “No Reader Response is present—teacher does not use reader response and students do not attempt to use it.” Therefore, the discussions and tables in this section only refer to those two categories. Of the 26 classes that discussed literature, teachers in 18 of them used reader response; Category 3b was used a total of 8 times. Reader response gained a higher level of engagement by .25 over Category 3b (4.23 to 3.98). The overall engagement for all 26 classes (including both categories) was 4.13.

Table 2 indicates the results for each Teacher. Teachers C and D discussed literature the most, followed by Teacher B and Teacher A. The next column indicates the number of days each teacher used reader response (18 total). The average engagement for each Teacher when he or she used Reader Response is stated in the next column. Those levels were higher than the engagement levels when teachers used Category 3b.

Table 2.

Teacher	Classes involving literature	Days of Reader Response	Engagement level for Reader Response	Days of Category 3b	Engagement level for Category 3b	Overall Engagement level-all classes involving literature
Teacher A	4	3	4.12	1	3.00	3.89
Teacher B	6	6	3.5	0	-	3.5
Teacher C	8	5	4.5	3	4.33	4.44
Teacher D	8	4	4.75	4	4.63	4.69

The final column indicates each teacher’s overall engagement, an average from of all his or her classes that involved literature, with no consideration of whether he or she used reader response or Category 3b. Teacher D gained the highest overall engagement level. This teacher used reader response 4 days, the second lowest of all the teachers. Teacher D used reader response and 3b equally, using both for 4 of 8 class periods. Teacher C had the second highest overall engagement; this teacher used reader response 5 of 8 days. Teacher A only used literature in 4 of the classes observed, which could contribute to the overall engagement level since the other teachers discussed literature on more observed days. Teacher B used reader response on every day literature was discussed, but gained the lowest overall engagement level. Figure 1 compares each Teacher’s overall engagement level to the number of days he or she used reader response to show whether the latter influenced the former.



Conclusions

As Milner and Milner (2003) write, reader response should be the starting point, but not the only level on which teachers engage students. Interpretive community, formal analysis, and critical synthesis are also important, especially when students face standardized testing that requires that they know important aspects from these areas. Still, results of this study show that reader response is extremely important in assuring that students come to care about literature and become involved in classroom discussions. The engagement levels clearly indicate that reader response is a powerful tool. However, Teacher D, who gained the highest overall engagement level, serves as an example of a teacher who understands that balance is important; reader response *and* more abstract levels of considering literature are beneficial to students. As in the case of Teacher D, balance proves successful when it is utilized to gain their attention and active participation. As Probst and Rosenblatt believe, students are more likely to be productive when asked to analyze literature more abstractly if they are first allowed to share their own personal responses.

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Do You See What I See? Visual Aids in the Secondary English Classroom

by

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Introduction

As education is continually studied and reformed, various ways of presenting new information and reviewing old ideas have evolved. The many means of representing knowledge can seriously affect a student's ability to learn and achieve because it has been proven that students make understanding of material in different ways. One way of presenting information that has become popular is through visual aids. Incorporating visual aids is a consequence of Howard Gardner's multiple intelligence study which proves that many students grasp knowledge through spatial intelligence (1999). Using tools that can be seen to facilitate learning helps those learners who need to envision ideas before being able to comprehend them. The questions this study seeks to answer are: 1. How prevalent are visual aids in the secondary English classroom? 2. What types of visual aids are used most frequently? 3. What are the most common purposes for using visual aids? 4. How do students respond to the use of visual aids?

Review of Literature

Going into any classroom today one would notice that the presentation of information to students can be different from teacher to teacher. A main reason for the various ways of teaching is the theory of multiple intelligences (MI). Howard Gardner (1993) first published his theory in 1983 which explained that intelligence is not a unitary trait, but people comprehend and portray understanding in different ways. The intelligences Gardner introduced were linguistic, musical, logical-mathematical, visual-spatial, bodily-kinesthetic, interpersonal, and intrapersonal (1993). Of the seven intelligences, visual –spatial is the least understood but has been a mode of learning of particular interest lately due to the improvements in technology that allows the use of more visual tools in any classroom (Kincheloe, 2004).

Visual literacy has become a popular and fun way to teach a variety of concepts. The term “visual literacy” is usually defined as “constructing meaning from a visual image” (Wikipedia). Generally speaking, due to modern technology, children have strong visual literacy skills because, from birth, they are exposed to illustrations that portray some type of meaning (Fransecky & Debes, 1972). Vision has actually been discovered as the primary sense that organizes information and since visual tools are popular in most societies, this is a commonality that students of various backgrounds will share (Kincheloe, 2004). Therefore, within one classroom, when a teacher uses graphics, most students should find comprehension fairly easy.

In an English class, teachers can find a number of different ways to focus on visual-spatial intelligence by using visual aids. Although more emphasis is put on the use of visual aids today, the image must be manipulated and utilized properly so that the desired educational goal is reached (Linker, 1968). For example, video tapes are popular visuals that English teachers incorporate. However, this medium needs to supplement the curriculum and can do so in five specific ways including condensing or expanding an experience, making the invisible visible, taking the students where he/she could not go, eliciting emotional responses, and clarifying events, issues, and concepts (Finkelstein, 1995). Graphic organizers are a common choice when teaching writing but a teacher should have a specific reason for using the visual. Employing graphic organizers for pre-writing and brainstorming have been known to get students into the writing process more quickly and help them to write longer, more developed papers (Bailey, 1995). To enhance lectures in any class including English, PowerPoint presentations are a positive choice. Students prefer this technology-advanced visual tool because PowerPoints are especially helpful in taking notes, which is a task many students work on throughout their education (Frey & Birnbaum, 2002). As an overall statement, teachers need to be careful when implementing visual aids so that the images are not just ostentatious tools but serve as instruments to enhance the learning environment.

A teacher who is thoughtful in choosing and manipulating visual aids can cause a significant improvement in classroom energy. This amelioration is detected by student reaction to the use of graphic tools. Students feel like the educator or presenter is more enthusiastic and organized when using visuals, especially those of higher technology like

PowerPoints and smartboards (Bushong, 1998; Frey & Birnbaum, 2002). An optimistic teacher presence in the room during any lesson will positively affect students and if visual aids increase the confidence of a teacher, these tools should be employed whenever possible.

Methodology

Subjects

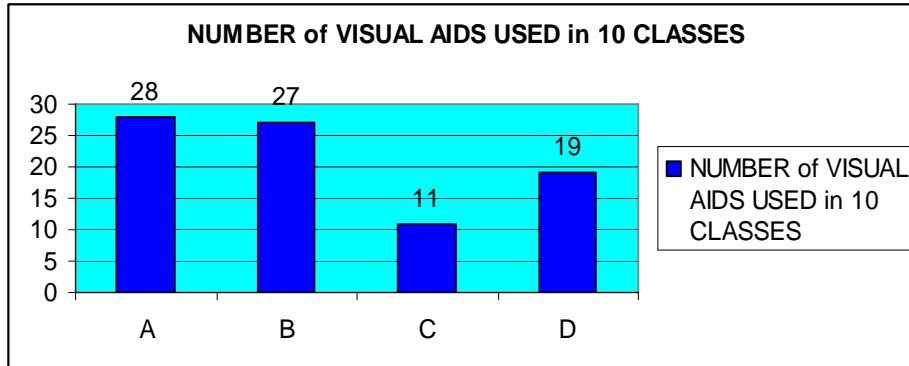
The subjects for this study were four high school English teachers and their students at a public high school in Winston Salem/Forsyth County, North Carolina. The classes included ninth through twelfth grade students of different ability levels and classes ranged in size from eight to twenty-seven students. No students were identified and teachers were referred to as Teacher A, B, C, and D.

Methods/Procedures

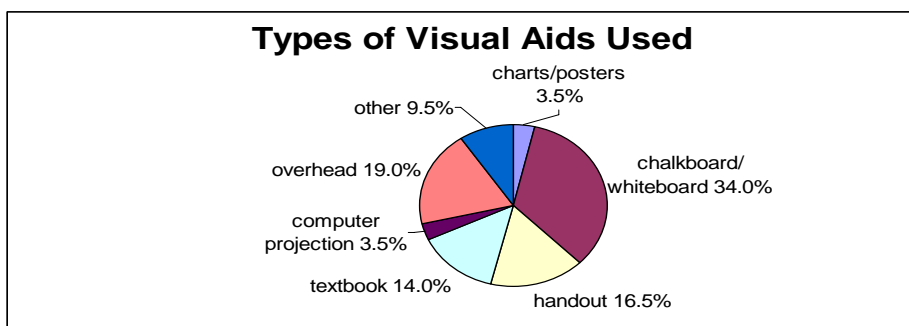
Each of the teachers' classes was observed ten times for a total of forty observations. Field notes were taken on every occasion that a class was visited. The purpose of the field notes was to see how often visual aids were used, what visual aids were used, the purpose of the visual aids, and student's engagement during use of visual aids. Visual aids were operationally defined as "any tool that can be seen by students and used by the educator to facilitate learning." For this study, visual aids included handouts/books, chalkboards/whiteboards, overhead projectors, posters, and computer projections. Teacher's purpose for using the tool was put into one of the following categories: giving assignments/announcements/ instructions, providing discussion/ explanation/examples, adding to a lecture, giving notes to be copied, and starting a new concept. A category of other was used to account for types of visual aids and purposes of visual aids not listed above, which included sketches or diagrams drawn on lined paper, papers to fill out, and articles to read. Overall classroom reaction during use of the visual aid were labeled as 2= very little participation, 3= some participation, 4= almost complete participation, and 5= high/complete participation. To generate results and conclusions, I analyzed the qualitative data gathered in the observations and generated quantitative data. The software Microsoft Excel was used to create data tables and graphs of the numeric information in percent form in order to compare the different types and purposes of visual aids.

Results/Conclusions

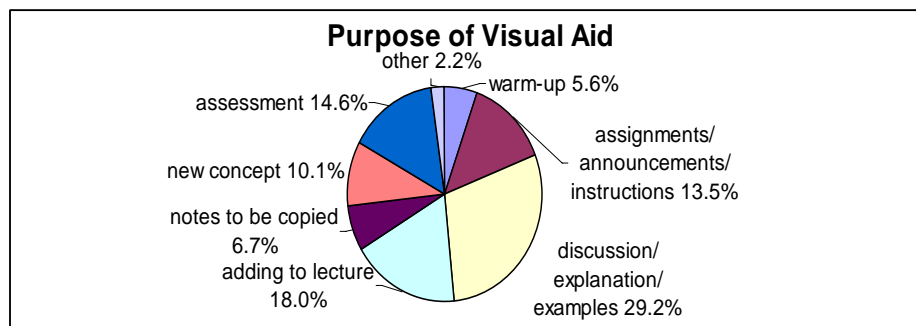
Data showed that visual aids are used quite frequently in the secondary English classroom. All four teachers used at least one visual aid during each class period, except for on two occasions when testing was being done. On average, teachers A and B used almost three visual aids in a class, while teacher C only used about 1 visual aid per class, and teacher D used approximately 2 visual aids every class. As a whole, these teachers used about 2.125 visual aids per class.



Based on observations of the four teachers, the most popular type of visual aid is clearly chalkboards or whiteboards, depending on which has been installed in the classroom. Through analysis, it was found that 34% of visual aids used in these English classrooms are chalkboards and whiteboards. Overhead projectors, handouts, and textbooks were used the next most frequently. These aids were used respectively 19%, 16.5%, and 14% of the time. Finally, the visual aids least used were others, including sketches and drawings on lined paper and graphic organizers which accounted for 9.5% of visual aids used, and charts/posters and computer projections which were both only 3.5% of visual aids used in the secondary English classroom. None of the teachers I observed used videos, slides, or LCD monitors, suggesting that the technology wave does not affect educational procedures as much as some would like to think. Teachers continue to use what is most familiar to them, chalkboards, overhead projectors, and textbooks.



Observation also revealed that the reason high school teachers use visual aids varies. Facilitating a discussion or providing an explanation and examples was the number one purpose to use visual aids. Almost 30% of the time that teachers used a visual aid it is for this purpose. Supplementing a lecture is 18% of the reason a teacher used graphic tools. 14.6% of visual aids were created by the student(s) to provide the English teacher with an assessment. Most of these were pictures drawn by students to portray meanings of words or texts. In order to guide students, teachers place instructions on the board or introduce a new topic through something that can be visualized. Giving assignments was 13.5% of the purpose to use visual aids, while 10.1% of these tools were used to launch a new idea. On the lower end of purpose for visual aids, were giving notes to be copied, facilitating a warm-up, and other, all being noted less than 10% of the reason for using visual aids.



In analyzing the data about student engagement, no obvious patterns were discovered between type of visual aid and learner interest. In using a ranking scale from 1-5 to judge student engagement, I saw no significant changes when teachers used different visual aids. For example, in looking at all the teachers' uses of a chalkboard or whiteboard, student engagement ranged from level two to level five. Interest when using an overhead projector, textbooks, handouts, and other visual tools ranged sporadically from level three to level five. No explicit mode of student engagement was seen in any of these visual aids. Using computer projections and posters did generate somewhat of a pattern of high student engagement which both produced clear modes of five. However, general statements about type of visual aid and student engagement cannot be made.

On the other hand, loose relationships were observed between the reason behind incorporating the graphic tool and student interest. Modes for each of the purposes for a graphic tool could be seen. The most common level of engagement for each reason of

using a visual aid is as follows: warm-up- 5, student creations as assessment- 5, giving notes to be copied- 5, discussion/explanation/examples- 4, giving assignments/announcements/instructions- 4, adding to a lecture- 4, starting a new concept- 4, and too little information was collected to report on engagement levels for other reasons. For all of the reported levels though, the most repeated level usually occurred less than 25% of the time, portraying that these are not very strong relationships at all. Nevertheless, data proves that any time a visual aid is used for a particular and well-thought purpose students are more likely to be interested, especially when it directly has to do with their grade.

This study was meant to explore the world of visual aids in the secondary English classroom. Other educators should realize that visual aids are important to the overall success of one's class and that teachers do use them about during every single class they teach. The four teachers observed did not incorporate highly technical visual aids and this was most likely due to their style and comfort with the older, more common tools. Teachers should use what is readily available, such as the chalkboard/whiteboard, handouts, and textbooks. Also, each teacher should personally realize what he/she is comfortable with and use those visuals. The point is that teachers should definitely use visual aids in the classrooms with a specific purpose behind their use.

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**Speak Up:
Teaching Practices that Encourage Oral Participation in the English Classroom**

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Introduction

The scene is familiar in many classrooms. An enthusiastic teacher poses a thoughtful question that students meet with silence. The teacher may rephrase or simplify the question. Still, no one volunteers an answer and, eventually, the teacher resorts to calling on an often reluctant respondent. In other cases, only a few students respond and ultimately dominate any further discussion. While many reasons can account for students' reluctance to speak in class, ranging from lack of preparation to low self-esteem, often the most important determinants of student participation are teacher practices. This study investigates the practices of teachers who inspire the most students to participate, or "speak up," in class discussions.

Literature Review

In *Bridging English*, Milner & Milner (2003) remind readers of the importance of teaching oral communication skills in the English classroom, noting that talking and listening are communication tools essential in all areas of life. While teachers may not have the opportunity to address oral communication explicitly, opportunities for implicit instruction occur daily through classroom discourse. In addition to practicing oral communication basics, researchers agree that students learn more when they actively participate in discussion. Nunn (1996) argues that "long-term learning depends on the learner actively processing the material" and finds that the best way for students to "actively process the material" is to participate in class discussions. Other researchers observe that students who participate in class discussions successfully recall and retain information at higher rates (Gamoran, Long, Nystrand, Wu & Zeiser, 2001; McKeachie, 1990).

Despite the proven importance of engaging students in class discussions, researchers express concern over deficiencies in the amount of time classes spent in lesson-related discourse. Goodlad (2004) observed more than 1,000 school classrooms to report that only 5.1% of class time is spent in class discussion. Additionally, Fehlman, Klages, & Marshall (1991), reported that student participation in discussions varies greatly between class levels and that the discussions observed in both low level and upper level classes were often dominated by only a small percentage of students.

As research shows, teachers need to work toward creating more class discussions in general and, in those discussions, engaging the most students possible. Christoph & Nystrand (2001) focus on “dialogically organized instruction,” those student-centered models in which teachers offer one or two questions to inspire discussion between students, as an ideal method for engaging students. Fehlman, et al. (1991) observe that asking low-level classes a series of simple questions results in higher participation rates. Giles C. (1994), attests to the power of small group work for making low-level students comfortable with speaking in class. All in all, there is not always consensus among researchers about the best methods for engaging students in discussion. And so, the question stands. What exactly can teachers do to facilitate oral participation and to create an environment in which passive students become active and quiet students “speak up”?

Methodology

This research presents a qualitative study conducted in the classrooms of four English teachers at a suburban North Carolina high school. In collecting data, the researcher observed each of the four teachers (A,B,C,D) for ten class periods. The teachers’ classes range from 9th to 12th grade and cover Regular, Honors, and Advanced Placement curriculum. During each class observation, the researcher took detailed field notes on discussions related to the day’s lesson, disregarding most conversations pertaining to administrative or personal matters. Using a tally system, the researcher recorded information regarding students’ oral participation rates and the three teaching practices defined below.

For the purposes of this study “oral participation” refers to any instance in which a student voluntarily answers a teacher’s question or makes a verbal contribution to a lesson-related, whole class discussion. In collecting data on oral participation, the

researcher tallied the total number of students who spoke at least once and calculated the percentage of the class participating. At times, the researcher also recorded the number of speaking turns taken by each participating student in order to estimate the percentage of discussion they controlled.

In the same classes, the researcher collected data on three specific teaching practices. First, the researcher recorded the number of teacher questions during discussion and categorized each question as either open or closed. Open questions are those inquiries that invite original, interpretive responses from students, while closed questions call for factual, prescribed responses. Secondly, the researcher recorded whether or not the teacher used small group work to preface whole class discussion. And third, the researcher recorded personal interactions between teachers and students, noting instances at the beginning or end of class in which a teacher initiated an exchange with an individual student on a topic of particular interest to that student. With the data collected, the researcher looked for any relationship between the number of students speaking in class discussion and the frequency of these three teacher acts.

Results and Conclusion

Ultimately, this study finds that the strongest determinant of students' oral participation in class discussions involves the number of questions posed by the teacher. On average, the teacher with the most students contributing to discussion sessions asked the most questions during those sessions. Teacher A, with an average 67% of students speaking in each discussion session, asked twice as many questions as Teacher D, with an average 41% of students speaking in discussions. The research finds a direct relationship between the average number of questions and the average number of student respondents in all cases (Figure 1 and Figure 2). In other words, as the number of teacher questions rises or falls, so do the number of students responding. In addition to asking the most questions, the teachers with the most students speaking in class tended to give all students an equal opportunity to answer. These teachers allowed adequate time for students to respond to their question before calling on individual students or providing the answer.

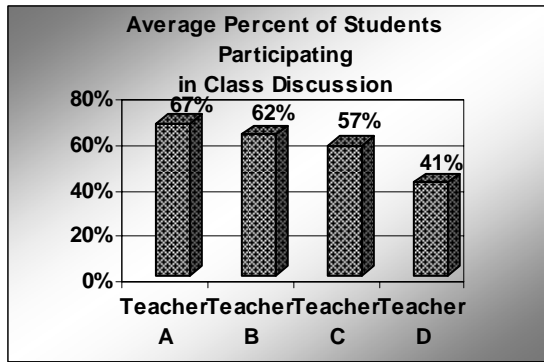


Figure 1

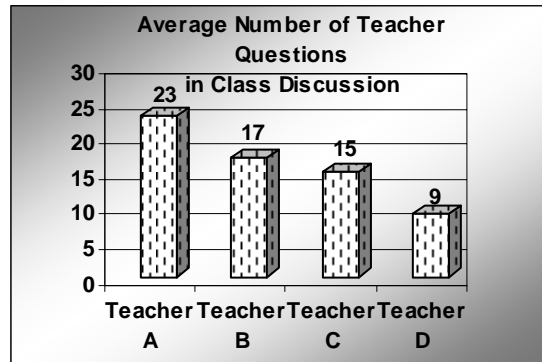


Figure 2

In interpreting this data, the researcher recognizes that not all teacher questions and student responses are equal. In addition to surveying the number of questions asked during discussion, the researcher also categorized these questions as either open or closed to trace the relationship between the question level, the number of students responding, and the quality of their responses. Overall, results showed that those teachers (A, B, and C) eliciting responses from over 50% of students in most classes posed more closed questions on average (Figure 3). These teachers often used closed questions to assess comprehension or scaffold a discussion that might lead to open questions that demand higher order thinking skills. Data from the narrative observations compiled in these classes, suggests that while more students responded to such closed questions, their responses were generally brief and basic.

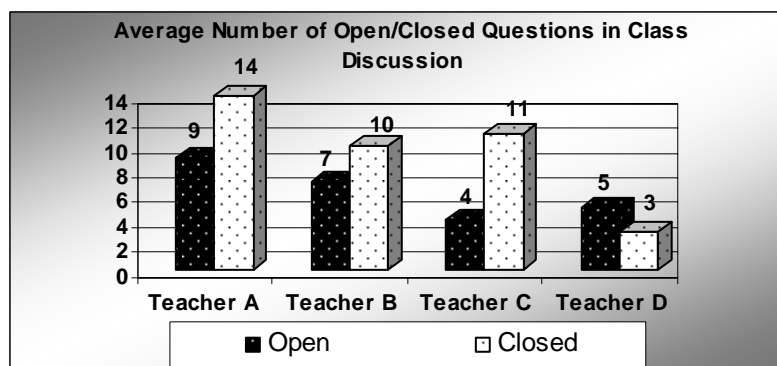


Figure 3

Teacher D was the only teacher among the four that asked more open questions on average. Considerably fewer students offered oral responses in these discussions. However, those responding took multiple turns and often made longer, more in-depth contributions than did those students responding to closed questions. Teacher B's

questioning practices also warrant discussion in terms of the use of open questions. While Teacher B posed more closed questions overall, this teacher allowed much more discussion time for select open, or essential, questions. Narrative data from the class periods in which Teacher B focused on one or two open question, suggests trends similar to those in Teacher D's classroom. While student responses were more substantive, only a handful of students dominated the discussion.

Overall, the data regarding teacher's questions suggests that more questions lead to more students participating in discussion. The research also reports that teachers asking more closed questions engage more students in discussion than the teacher asking more open questions. However, it should be noted that these closed questions result in what critics refer to as recitation discourse, in which the exchange is exclusively teacher-centered and the students' responses are rarely in-depth. Ultimately, the use of closed questions increased the quantity of students participating but not necessarily the quality of the conversation.

The next teacher action that the researcher considered was the use of small group work as a regular class activity. The logic behind this focus is the idea that students who become comfortable speaking in a small group will be more likely to contribute to whole-class discussions. The researcher observed very few examples of small group work on the whole, with only six instances recorded between all four teachers during the course of the study. Teacher D used group activities the most frequently, accounting for four out of six instances observed. Due to the lack of data, the researcher cannot draw any sound conclusions on the relationship between small group work and the number of students speaking in class. However, it is worth noting that on average 77% of students in classes with less than 10 students (upper level and lower level) participated in class discussion, while only 54% of students in all larger classes participated. While teachers rarely have control over the size of their classes, this statistic suggests that group size is a major factor in students' willingness to speak in class.

The final teacher action that the researcher considered was personal interaction between teachers and students. Examining this relationship again speaks to the idea that by creating an open, comfortable class environment, teachers might encourage more students to speak in class. As explained in the methodology, a personal interaction is

initiated by the teacher to draw students into personalized conversation. Results show that Teachers A and B engaged in slightly more personal interactions with students (11 and 17 respectively) while Teachers C and D were close behind (with 7 and 8 interactions). Teachers A, C, and D have counts within one to two points of one another, variations that could easily have been different had the researcher happened to observe on other days. Again, the data cannot prove a close connection between personal interactions and the number of students participating due to the limitations to this research, but it does make the suggestion that connecting with students individually helps in drawing them into whole class dialogue. However, this question warrants more extensive research.

In summary, this research finds a strong correlation between the number of questions that teachers ask and the number of students speaking in class discussions. On average, the teacher with the most students contributing to discussion sessions asked the most questions during those sessions. The research also finds that asking more closed questions results in more students participating in class discussion. However, these students' responses are often brief and basic. Student responses to open questions were generally more substantive. Additionally, the research suggests that creating a comfortable classroom environment, whether by working in small groups or chatting with students, shows potential for being a major factor in the number of students speaking in whole class discussions, although more research on this connection would be necessary before coming to any full conclusions.

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Teaching Grammar for Proficiency in the Secondary French Program

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The *Standards for Foreign Language Learning* (ACTFL, 1996) address the content knowledge students should know as a result of foreign language study. The *Standards* promote five goals for language learning: Communication, Cultures, Connections, Comparisons, and Communities; of these, Communication is the central goal (ACTFL, 1996). Similarly, the *ACTFL Performance Guidelines for K-12 Learners* (ACTFL, 1998) describe language performance of K-12 students at stages of language development (novice, intermediate, pre-advanced) and serve as a measurement of student knowledge of the *Standards*. Student performance is defined within the framework of the three modes of communication (interpersonal, interpretive, presentational) (ACTFL, 1998). In order to communicate effectively in a comprehensible manner in a language, one must abide by certain linguistic rules. Research shows that grammatical instruction as an end in and of itself does not promote proficiency (Celce-Murcia, 1991, p. 466), but rather rote memorization. Teaching grammar within a communicative context, however, leads to higher levels of linguistic proficiency than when practice is not contextualized (Frantzen, 1998). Although foreign language instruction focused more on grammatical rules prior to the proficiency movement, the *Standards* and *Performance Guidelines* emphasize context and communication for measurable proficiency outcomes (ACTFL, 1996).

Review of Literature

Foreign language instruction over time should yield measurable proficiency outcomes. Proficiency is defined as the level of ability at which one can communicate in the target language compared with a native speaker of that language. Proficiency in a foreign language is essential to being able to communicate in a pluralistic American society and abroad; thus, foreign language education seeks to prepare students both linguistically and culturally to participate successfully in this society (ACTFL Website,

2006). Opportunities to use the target language to communicate and to construct meaning lead to proficiency development, and the level attained is directly proportional to the amount of time spent communicating in the target language (Curtain & Dahlberg, 2003). The *Guidelines* suggest that for language instruction to truly be communicative, it should focus on each of the three modes of communication. A proficiency-oriented classroom supports the Communication Goal through the incorporation of each of the three modes and provides opportunities for students to use grammatical structures for proficiency-oriented outcomes in a meaningful and contextualized manner.

Learners may not achieve the Communication Goal through an emphasis on explicit knowledge of language rules if the language is not contextualized (Shrum & Glisan, 2005). Although foreign language teachers may find it challenging to incorporate grammar into their instruction within the communicative framework, the National Standards emphasize that “knowledge of the language system, including grammar, vocabulary, phonology, and pragmatic and discourse features, contributes to the accuracy of communication” (Shrum & Glisan, 2005, p. 190). Therefore, focus on form, when it is relevant to the communicative task, can be useful to foreign language learners. Hence, grammar that is necessary for communication, rather than a predetermined syllabus, should guide instruction (Ellis, 1988; Herron & Tomasello, 1992).

Contextualization is important as students learn to communicate in the target language and as they learn grammar because grammatical structures learned in isolation are likely to be remembered only in similarly isolated contexts (Lyster, 2004). Therefore, in the foreign language classroom, activities that practice form should engage learners in meaningful and purposeful use of the language by connecting them to authentic communication purposes (Hadley, 1993; Met, 1996), and “instructional experiences should emphasize the development of understanding rather than the decontextualized memorization of vocabulary lists and grammar rules” (Met, 1996, p. 4). The contextualization of meaning and form will permit acquisition to take place. According to Terrell (1986), binding is “the cognitive and affective mental process of linking a meaning to a form” (214). Contextualized language instruction aids in binding form and meaning so that foreign language learners can access acquired forms for communicative purposes (Terrell, 1986).

One of the most effective tools for contextualized instruction in the language classroom is the target language itself (Curtain & Dahlberg, 2004). Formal grammar lessons should be brief and uncomplicated so that instructional time can be spent on active, creative language practice, and the focus of instruction should be on speaking *in* the language, not *about* the language (Hadley, 1993). Students should be “immersed in meaningful activities, not submerged in the grammatical details of a new language” (Freeman & Freeman, 1992, p. 26).

For language instruction to truly be communicative, it should develop each of the three modes of communication. Grammatical knowledge can be developed through the implementation of communicative activities that focus on form while being both communicative and contextualized. The three modes are interconnected, act together, and promote the development of one another; therefore, activities can be linked together to synchronously develop the modes (Hall, 2001). Linking activities allows learners to be constantly engaged in some form of communication or negotiation of meaning (Savignon, 1987). It is important to note that foreign language instructional activities can be communicative but not necessarily performance or proficiency-based. If students’ language outcomes and products are not assessed according to the language ability features of each level of proficiency development of the *ACTFL Performance Guidelines for K-12 Learners* (1998), the instruction is *not* proficiency-based. Foreign language teachers should design and implement proficiency-based communicative instruction in order to be able to measure proficiency outcomes.

The presentational mode of communication includes communicative activities that involve the creation and presentation of oral or written texts (Hall, 2001; Curtain & Dahlberg, 2004; Shrum & Glisan, 2005). Foreign language teachers design instruction to develop the presentational mode by selecting activities in which students are to demonstrate communicative competence and then identifying what students ought to be able to do within those activities (Hall, 2001). Activities that may develop the presentational mode of communication include performances, formal presentations, story telling, journal writing, task-based writing, and technology-based activities (Hall, 2001; Shrum & Glisan, 2005). The interpersonal mode of communication involves interaction and sharing of information with others (Hall, 2001; Curtain & Dahlberg, 2004; Shrum &

Glisan, 2005). Activities designed around the interpersonal mode of communication should address the wants and needs of students so that they can become communicatively competent. They should also reflect the sociolinguistic context of the classroom and the culture of the target-language (Hall, 2001). The interpretive mode of communication consists of communicative activities accomplished through reading, listening, or viewing written, audio, and visual texts (Hall, 2001; Curtain & Dahlberg, 2004; Shrum & Glisan, 2005). Designing instructional activities around the interpretive mode involves the identification of the communicative activities in which the learners want or need to become communicatively competent and the identification of the communicative components of each activity (Hall, 2001).

The purpose of this study was to investigate the instructional strategies employed by middle and high school French teachers to teach grammar to develop students' proficiency in French. The researcher sought to investigate effective strategies that align with the *ACTFL Performance Guidelines* and that lead to performance-based outcomes.

Methodology

The two-part study involved five high school and three middle school French teachers in a public school district located in central North Carolina. Data was collected during October, 2006. The subjects were purposefully selected through recommendation of the researcher's advisor. After consent forms were obtained, the researcher interviewed the eight French teachers using a researcher-designed interview instrument. The first part of the study involved teacher interviews which lasted approximately one hour and were audio taped to be used post-interview as a reference tool. Questions focused on instructional methods used by the individual teacher to teach grammar for proficiency outcomes in French. During the second part of the study, the researcher observed one class of each of the teachers in order to see strategies used in instruction that the teachers discussed in the interviews, particularly communicative strategies employed by the teachers when teaching grammar. The researcher observed whether or not these contextualized activities were also measured and assessed in order to yield proficiency outcomes. Responses and observation notes were analyzed in order to determine performance-based and context-based strategies for teaching grammar for

proficiency in French, the role of the textbook when teaching grammar, and the role of assessment.

Results and Conclusions

The researcher analyzed the information collected during the interviews and observations and found the two sets of data to align in some regards, but found many discrepancies as well. For example, before beginning to develop instruction for proficiency outcomes, it is essential that teachers understand proficiency and performance-based instruction. The researcher found that all of the teachers had some notion of both of the aforementioned terms and likewise had some knowledge of the National Standards and Performance Guidelines. Nonetheless, when the teachers were asked about their expectations, the school's expectations, and the district's expectations with regards to proficiency development, answers were varied and unclear, despite the fact that all teachers are in the same district.

Proficiency-oriented instruction is not dependent on a particular mode of instruction for presenting grammatical concepts (i.e. explicit or implicit), and the National Standards and Performance Guidelines do not propose a set method for teaching grammar. However, each insists upon engaging students in meaningful, context-rich, communicative activities so that students are able to produce language for communicative purposes. With only one exception, all teachers reported during interviews that they teach grammar in context. However, during the observation sessions, the researcher noted that very few teachers did indeed contextualize grammar instruction. Based on interview and observation results, the researcher believes that teachers may not contextualize activities or structure performance-based activities when teaching grammar, even though they may intend to or may be aware of the suggestions of the research. This may be the result of a variety of factors, such as time constraints, a belief that explicit, form-focused instruction is simpler, or a concern that students will not grasp difficult concepts without explicit, form-focused instruction and practice.

In contrast, the interview portion of this research yielded positive results regarding methods teachers stated that they use to teach grammar for proficiency in French. Teachers reported that they teach grammar in context, use authentic materials, structure instruction to develop the three modes of communication by incorporating a

variety of communicative activities, and assess student outcomes in multiple ways. Thus, the researcher concluded that the teachers are aware of the importance of performance-based teaching and the instructional measures and methods necessary to make their grammar instruction performance-based. However, the observation portion of this research led the researcher to further conclude that, in general, teachers' actual instruction of grammar was not focused on proficiency in French, but rather on knowledge of discrete forms for structured use, rather than for authentic communicative purposes. The researcher does maintain, however, that teachers may indeed teach for proficiency outcomes, as suggested by interview responses, but that, during the limited observation periods, teachers did not engage in such practices. In order to more fully investigate instructional methods for teaching grammar for proficiency, more prolonged observation of instruction is necessary in order to draw firmer conclusions about the methods that teachers employ to achieve proficiency in French and to observe the actual student outcomes over a period of time.

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Gender and Racial Difference in Academic Motivation of High School Mathematics Students

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Motivation has been considered as being crucial to learning (Thibert & Karsenti, 1996), and could be perceived as one of the most important psychological concepts in education (Vallerand, Blais, Brière & Pelletier, 1989). Turner and Patrick (2004) comment that the students who succeed in schools more often are the students who are motivated to learn.

Mathematics is traditionally a male dominated subject. Even with females closing the achievement gap, males continually perform better than females on standardized tests in mathematics (AAUW, 1998). Females typically perform better on open-ended tests while males typically perform better on multiple-choice formatted tests, possibly contributing to this standardized achievement test difference (Beller & Gafni, 2000).

Minorities have also faced their own biases in the American classroom in different ways. A constant struggle for equity in schools continues today for all minorities, long after the days since most schools were desegregated. Stull (2002) states that even though the achievement gap may still exist, minority students are continually behind non-minority students in areas of achievement.

Review of Literature

The subgroups, determined by race and gender, could get their motivation from different sources, resulting in the way they perceive school and mathematics, as well as how they react in academic situations. With differences in achievement of the subgroups, differences in motivation could be a simple explanation to those differences.

White males have shown the most motivation for a technological career when they are given encouragement and advice, along with generally holding a high value for mathematics (Zarrett & Malanchuk, 2005). Similar to other subgroups, the White males'

career choice was often determined by factors in high school, including the encouragement they received and the courses they took. Also White males were more likely to enter a mathematics-based career when they had a high level of achievement during high school. There seemed to be less factors coexisting, pushing White males into a mathematically based field of study, a possible explanation for why White males are the most likely to enter this type of field.

White females are least likely out of the subgroups to have a technology-based career, but it was generally their self-concept of their computer skills which motivated them in entering a technology-based field of study (Zarrett & Malanchuk, 2005). When considering other mathematically based careers, White females' field of study was most affected by their sophomore choice of field of study and their senior math/science courses completed (Maple & Stage, 1991). Also, this subgroup was least likely to find value in mathematics (Catsambis, 1994), possibly causing them to enroll in less math or science courses, and then resulting in choosing a field of study in another content area.

Kondrick (2003) found that Black males tend to persist in mathematics-based fields as much as, if not more than, White males. Black males' eventual field of study was most determined by their mother's level of education completed, their major chosen by sophomore year, and the number of senior mathematics and science courses taken (Maple & Stage, 1991). Encouragement for Black males seemed to help in a variety of contexts. All of the factors motivating Black males to enter a mathematically based career are strongly tied to their attitudes towards mathematics.

Overall, Black females had lower expectations for themselves, and encouragement seemed to help them the most in becoming more motivated than the other subgroups (Zarrett & Malanchuk, 2005). Interestingly, Zarrett and Malanchuk's (2005) study found that Black females' parents' education and expectations had a reverse effect on their motivation. Unlike other subgroups, Black females tended to become more motivated when their parents had lower levels of education. In a study by Kondrick (2003), Black females had the lowest persistence rates in mathematically based fields when all other factors looked at were controlled. Going beyond their parents expectations, Black females need constant drive, encouragement, and praise.

Rouse and Austin (2002) found that when comparing Black females with males, that the “high-ability females demonstrated the most motivation in beliefs about ability, beliefs about control, and beliefs about value/importance, while low ability females demonstrated the least amount of motivation” and Black males’ motivation levels were somewhere in between (p. 303). Maple and Stage (1991) found that Black females’ field of study is most determined by sophomore choice of major, math attitudes, and the number of math and science courses completed through their senior year of high school. Indirectly, math/science experiences, test scores, and math attitudes were significant to their choice of major.

White students’ course enrollment plans have been shown to be positively related with parental influence, where White students are more likely to have plans of taken mathematics and science courses when their parents are involved (Maple & Stage, 1991).

It is important for teachers to consider past research when dealing with their classes. The current study investigates gender and racial differences in mathematics academic motivation. Knowledge of differences in motivation could allow for insight in helping to narrow the achievement, degree, and career gaps.

Methodology

Students from six mathematics classes at a suburban high school in central North Carolina participated in this study. The school is approximately 50% White/Caucasian, 40% Black/African-American, and 10% Hispanic. There were a total of seventy-four students which were survey, with twenty whom were also interviewed. The number of consent/assent forms returned made the four subgroups for the interviews consist of seven White males, four White females, four Black males, and five Black females for the interview portion of the study.

The questions for the surveys and interviews were chosen to explore academic motivation and possible causes or sources of motivation or a lack of motivation in students. The survey has a total of nine questions in which the students were asked to rate themselves on a scale from 1 to 5. These questions asked the students about relevance, importance, and value held of mathematics, as well as the importance of family and friends. The interview questions had eight questions asking the students more open-ended questions relating to their futures and what is relevant in their current lives.

The researcher distributed copies of the surveys to students of all races and gender, with no specific selection process, other than teacher-volunteered classes. The surveys were then grouped into the different subgroups, discarding those of races not being studied or incomplete surveys. The researcher then went through each question on the survey, tallying the totals for each subgroup for each level of rating. The rating of a 4 or 5 was considered a high or strong level of rating, which was recorded and examined.

The survey questions were divided into six main categories: mathematics attitude, mathematics value, mathematics motivation, school importance, peer influence, and family influence. Each subgroup's student percentage of high ratings were calculated, examined, and then discussed with conclusions

The second phase of the research study primarily included brief interviews with the twenty selected participants. The responses to the interview questions were audio-recorded (with permission) for later analysis.

Results and Conclusions

Student attitudes towards mathematics showed a very slight difference in gender, but a greater difference between the races with forty-four percent of the Black students and half of the Black females with the largest percentages who reported highly positive attitudes. Student value of mathematics and mathematics motivation appeared greatest by Black students, with sixty percent of Black females and fifty percent of Black males for both, which averaged about twenty to thirty percent more than that of White students. Forty-seven percent of Black females reported a strong importance for school, making them the subgroup with the largest percentage, opposed to only thirty-seven percent of White males, with the lowest percentage of students showing an importance of school. White students showed much higher levels of peer influence than Black students by thirty percent, with no Black males and ten percent of Black females showing a strong peer influence. The Black students had one hundred percent with a strong family influence, and the White students had only ninety-one percent indicate a strong family influence.

White males showed the lowest percentages of mathematics motivation and school importance of all subgroups in the surveys. They interestingly showed the most interest in having a career as a lawyer or judge, with three out of seven of the White males interviewed indicating so. No students from any of the other subgroups had any

indication to these types of careers. These are very ambitious career goals, surprisingly after White males having lower mathematics motivation. White males may not understand the importance mathematics has on their lives, especially when their career goals are often not directly related to mathematics. As one White male responded during the interview when asked about homework, “Uhh, I don't enjoy it, but I go to school, so I guess just get it done.” In his response, even his attitude towards school seems negative and shows little motivation towards schoolwork.

In the surveys, White females showed the most peer influence and the least value in mathematics. Females are often seen as more sociable types of people, which could be used to their advantage in the mathematics classroom, where traditionally the subject matter is not discussed. With White females having the least value in mathematics, approximately twenty-three percent less than any other subgroup, the value of mathematics needs to be especially taught to them. With career goals more often in the humanities and life sciences than the hard sciences, White females undoubtedly would have the lowest connection to mathematics. Teachers could often bring White females into the mathematics classroom through describing famous women in mathematics, or bring in projects or examples from the life sciences in solving mathematics problems.

The one category response that stands out is the Black males reporting the lowest peer influence, with zero percent indicating a reasonable amount of peer influence in their lives. This could mean that the Black males would least fall under peer pressure or allow their peers to influence their decisions. The interviews proved to be fairly inconclusive for the Black males subgroup, possibly explained by them describing a variety of career goals and aspirations, from sports to mathematics and computers. They reported that their parents would like for them to attend and graduate college more than anything else. They perceive school as helping them generally in life more than to get a good job. As one Black male mentioned, the purpose of school is “to teach us how to be adults.” However, the Black males showed the least motivation in life goals with some members commenting on not seeing a purpose in homework or grades, not completing classwork or homework because they do not want to, or not even having a career goal.

The Black females surveyed showed the highest value in mathematics, high attitudes towards mathematics, high mathematics motivation, and the highest level of

school importance. This was interesting since the Black females interviewed had a larger interest in the humanities and life science fields of study. Possibly to explain the high positive levels towards mathematics is that Black females more often enjoy doing their homework than the other subgroups. They could find more enjoyment and meaning out of school than other groups. Also, Black females equally thought of the purpose of school as being to give them a good education, as well as helping them in life. As noted by one particular Black female, school is important because it will help you, “get an education...so you can pursue your dreams.”

Surface differences such as race and gender, could aid in identifying student needs and differences in the mathematics classroom. This study was performed in one particular high school under two mathematics teachers. Clear differences in races and genders were seen in most of the categories relating to academic motivation. These differences may not necessarily be the same in all high schools, but differences do exist.

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Journaling in Geometry: A Study of Students' Attitudes and Achievement

by

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Introduction

“Combining writing with mathematics is a natural partnership for achieving the high-level standards of learning and thinking that schools are seeking” (Rothstein, Rothstein, & Lauber, 2003, pp. 4-5). Content journaling is one writing-to-learn technique that can be used to promote math students’ appreciation of mathematics and development of critical thinking, reflection, and communication skills. Journal writing can allow students to express their feelings and receive feedback from their teacher, and, as with many other teaching and learning methods, it can be adapted to meet varying needs (Connolly & Vilardi, 1989). According to Masingila and Prus-Wisniowska (1996), carefully chosen journal prompts can assist students in their quest to connect newly-learned material with prior knowledge and to develop a deeper understanding of mathematics. In addition, journaling may help students think reflectively about the connections they have already made.

Review of Literature

Journaling in Geometry

While the content of the math being studied during the use of journaling likely makes little difference in the degree to which students are able to learn from this process, several research studies have been conducted to look specifically at the effectiveness of journaling in geometry. Olson (1998) studied two high school geometry classes, and she determined that journal writing, combined with use of realistic application problems and cooperative learning, helped to improve students’ attitudes and their mathematical achievement. After conducting a quasi-experimental study on integrating writing to improve geometry achievement and statistically analyzing high school students’ test scores, Thayer and Giebelhaus (2001) wrote the following:

The results of this study indicated that the mere integration of journal writing to the instruction of geometry produced highly significant increases in the level of achievement of target concepts. It required no expensive materials, books, equipment, programs, or teacher training. It required no special student instruction. It simply took an existing skill (writing), at whatever level, and applied it as a tool for learning geometry. (p. 15)

Affective Benefits of Journaling in Mathematics

In some cases, studies which were originally intended to research the effects of math journaling on achievement have also shown that this journaling affects students' confidence and attitude toward math. Through conducting student interviews, Johanning (2000) discovered students' three main perceived benefits related to writing in math. They described writing as a way to find mathematical errors, remember problems better, and understand concepts more clearly. These realizations likely contributed to Johanning's observation that writing increased students' self-esteem.

Jurdak and Zein (1999), who had studied the effects of journal writing on achievement in and attitudes toward mathematics a year prior to Johanning's study, found that journal writing helped develop students' conceptual understanding, procedural knowledge, and mathematical communication. Additionally, although the affective benefits of journaling were not directly supported by their attitude scale data, Jurdak and Zein concluded that the students enjoyed math journaling. An open-ended questionnaire was used to determine students' views on their journaling experience, and, overall, students had positive responses. Students found math journaling to be an enjoyable endeavor and an opportunity to learn and to express themselves. According to Pinzker (2001), students who have a greater understanding of mathematics are more likely to feel confident in their mathematical abilities and to enjoy math overall.

The Future of Math Journaling

The topic of writing as a means by which students can learn mathematics and improve their attitude towards the subject is one which has been studied numerous times with varied results. The main conclusion of these studies is that more research is needed on the topic, and this study will serve that purpose while examining students' attitudes and achievement after journaling in geometry.

Methodology

Participants for this study consisted of 22 eighth grade honors students from an intact geometry class. This class was chosen from a school in the Winston-Salem/Forsyth County school district in North Carolina.

After selecting an intact geometry class, the researcher administered journal prompts to the students in this class five times over a three week period. During the first journaling session, students randomly selected a numbered folder containing blank sheets of paper on which to respond to journaling prompts. Each student's folder number became his/her anonymous research identification number. The researcher collected these folders after each journaling session, provided written feedback in students' journals, and passed the folders around the room at the beginning of each new journaling session for students to reclaim their journals anonymously. Near the end of the study, students were also asked to complete an attitude survey created by the researcher.

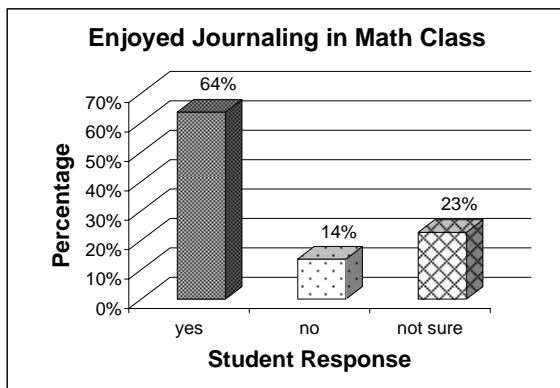
For the purposes of this study, the researcher created student journal prompts and a student survey. Some of the journal prompts asked students to explain recently-covered geometry topics, while others required students to respond to more reflective/open-ended questions. The student survey produced by the researcher was intended to give students the opportunity to verbalize their opinions on journaling in math class at the conclusion of the study. The questions on this survey were focused on discovering whether or not students enjoyed math journaling and/or found it to be beneficial, whether or not students would choose to continue math journaling, and how students' attitude toward math journaling related to their attitude toward math and/or writing in general. Students were also asked to describe how their grade in geometry had been affected by journaling.

In order to determine students' attitudes toward math journaling in geometry, the researcher analyzed students' narrative survey responses. The researcher also calculated the percentage of students who enjoyed math journaling, the percentage who found it to be beneficial, and the percentage who would choose to continue math journaling. These percentages were compared to the percentages of students who claimed to like math and/or writing in general. In addition, after pairing students' journals and surveys using their anonymous research identification numbers, the researcher analyzed students' journal entries in order to draw further conclusions.

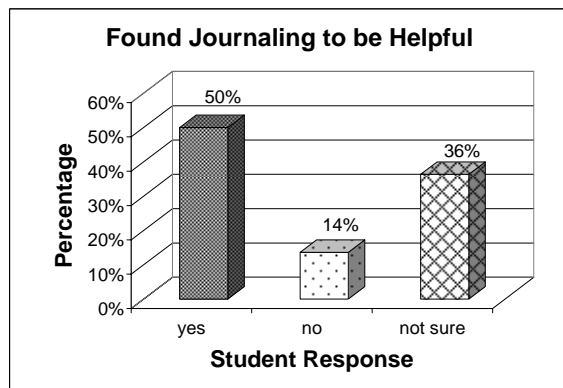
Results

Students' survey responses indicated a positive attitude toward journaling in mathematics. Out of 22 students surveyed, 64% enjoyed journaling in their math class (Graph 1), 50% found the journaling to be helpful (Graph 2), and 73% would choose to continue journaling in math classes if they were given a choice (Graph 3). Additionally, out of the students who expressed that they do not usually enjoy writing, 71% did enjoy journaling, and, out of the students who said that they do not usually enjoy math, 80% did enjoy journaling (Graph 4).

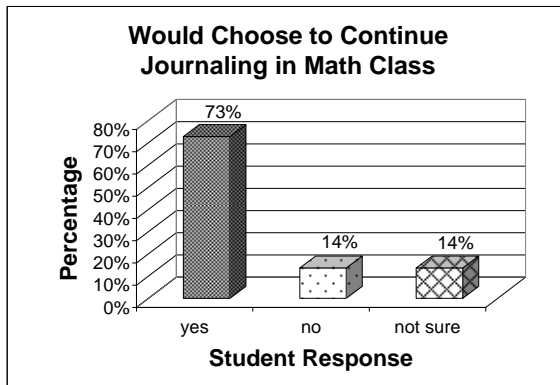
Graph 1



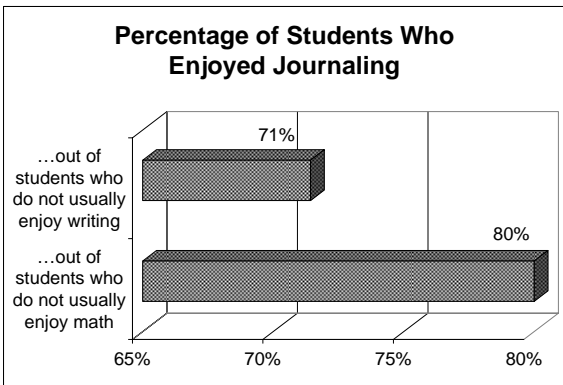
Graph 2



Graph 3



Graph 4



When students were asked what the best things were about journaling in their math class, Student 3 said, “[Journaling] made me think and really understand the problems better.” Several students also mentioned preferring journaling in math to some of the more traditional math-teaching techniques. Student 7 said, “I liked being able to talk about math instead of doing it. Math is not my forte. Writing is.” The main things that students mentioned as “the worst things about journaling in math class” were that it

took a lot of time and, mainly for students who said they disliked writing in general, that it required writing!

Students were also asked to explain how their grades in geometry had been affected by the journaling that they had done with the researcher. Student 22 said, "...journaling has affected how I look at geometry. I think the journaling is very good for helping us understand geometry better and improving our grades." Other students had similar descriptions of the way in which math journaling had improved their grades in geometry. Student 17 said, "My grade has probably gone up because I started to actually understand and connect with geometry. I started to do what you could call thinking outside the box." Many of these students agreed that journaling had helped them to understand and remember the material better. Student 19 responded to the question saying, "It has made me think a lot about my work and has made me more aware of why I do the steps I do when [I] solve equations! I have done at least 5-10 points better because now I think a lot more while taking my tests." The main response from students who did not indicate that their grade had been positively affected by journaling was that they were not sure what their current grade in geometry was.

Conclusions & Implications

Students' survey responses provided valuable information about their attitudes toward math journaling. On the other hand, students' journal entries provided the researcher with a unique perspective on students' learning. In one journal entry, Student 16 wrote, "One thing that I know for sure will be on the test [is] line equations, which relates to real life in a way I have yet to discover." In response to this entry, the researcher mentioned several aspects of society which depend on the slope of a line (architecture, construction, navigation, transportation, and sports, to name a few) and said, "When it comes to parallel and perpendicular lines, you can think of roads which run parallel and perpendicular to one another. Geometry is all around us!" Not only did this student-researcher interaction, among others, provide the researcher with insight, it was also a learning experience for the student. In response to the survey question about whether or not students' grades had been affected by journaling, this same student noted, "I think my grade in geometry has been positively affected by the journaling because ... the [researcher's] feedback helped to build my appreciation of geometry."

Overall, this study found journaling in geometry to be enjoyable and beneficial to eighth grade honors students. Students noted that journaling led to increased understanding and appreciation of the subject matter, and, clearly, the student-researcher interactions which resulted from journaling were beneficial to both students and the researcher. In fact, journaling in this geometry classroom even appealed to the majority of students in the class who do not generally enjoy writing or math. Math educators should consider the benefits of journaling in mathematics and how best to tailor this method to suit their own students' needs. Students of all mathematical abilities can gain from the opportunity to practice writing outside of an English classroom, and this reasoning can be applied to support journaling in any number of content areas. The ability to communicate one's knowledge effectively is an important skill which can assist students in life after high school, and, as in the real world, the disciplines taught in schools should be interconnected. Not only can math journaling help students to gain a greater understanding of subject matter, provide teachers with valuable insight, and appeal to students for whom math may not be enjoyable or to whom math may not come very naturally, it is also a cost-effective teaching tool; the journals used in this study were matching green folders purchased by the researcher for only 25 cents each! This study provides further evidence that journaling can be successfully implemented into a mathematics classroom and, more importantly, that this implementation can improve students' attitudes and achievement.

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The Use of Visuals in the High School Spanish Classroom

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Introduction

The *National Standards for Foreign Language Learning* (ACTFL, 1996) and *ACTFL Performance Guidelines for K-12 Learners* (ACTFL, 1998) provide a plan for student proficiency development in the nation's schools in grades K-12. The proficiency movement emphasizes the Five C's (Communications, Cultures, Connections, Comparisons, Communities) in designing language experiences that lead to communicative ability. The foreign language classroom is a diverse setting in terms of students' cultural backgrounds, life experiences, cognitive and linguistic development, and in particular, learning styles. Rose (1987) stated that there are three distinct learning styles—visual, auditory and kinesthetic (and tactile). Because classes have students of many ability levels and diverse learning styles, foreign language teachers must design instruction that meets their needs through multiple representations of the content. The use of visuals in foreign language instruction can be an effective strategy because they appeal to many learners.

Literature Review

How does a student at the secondary level learn a foreign language? Krashen's (1982) Input Hypothesis demonstrates how language is acquired. He describes acquisition as the subconscious acquisition of rules that is similar to the L1 acquisition process. Learning, however, is a conscious focus on knowing and applying the rules. Krashen (1982) asserts that acquisition occurs once foreign language learners are given substantial input that is interesting to them and then are given input that is one level above their current level of comprehension or INPUT + 1. Foreign language teachers can

help their students achieve this by supplying them with background knowledge, contextual information or gestures. How do visuals fit into the foreign language learning process? Krashen (1982) found that visuals are important because they can provide comprehensible input plus one by assisting the learners to connect meaning with form. “Input” refers to the current competence of the learner and “plus one” refers to the next level of competence that is a little beyond where the learner is at that time. The presence of additional stimuli in the foreign language classroom is necessary because of the diverse learning styles of the students.

Research regarding the use of visuals in foreign language instruction points to effective results with learners (Pouwels, 1992; Lee, 1994; Krashen, 1982; Omaggio, 1979). Visuals can be used to enhance reading, writing, and listening activities in the foreign language classroom. Visuals can also help students gain input, organize ideas, visualize ideas, and deduce more complex concepts (Mueller, 1980; Glisan, 1988; Bransford & Johnson, 1972; Pouwels, 1992). Both Kang (2004), Krashen and Terrell (1983) agree that in order for foreign language students to gain proficiency, visuals must be implemented in the classroom and be used in a purposeful and effective manner. According to Elliott, Formhals, and Wheat (2002), in the foreign language classroom visuals cater to the diverse needs of auditory, visual and kinesthetic learners. When considering the needs of diverse learners in the foreign language classroom, it is imperative that the most effective classroom methodologies be determined to facilitate an increase in students’ language ability. The purpose of this study is to determine how high school Spanish teachers use visual aids in effective instructional practices to help students develop language ability.

Methodology

Ten high school Spanish teachers who teach Levels I, II, III, IV, and V from a located in Central North Carolina participated in this two-part study. First, the researcher interviewed each Spanish teacher for approximately forty-five minutes. The interview questions were designed by the researcher and included questions about instructional strategies that high school Spanish teachers use to teach Spanish. During the second part of the study, the same ten teachers were observed in their respective classrooms for one

hour each to see how each uses visuals in their instruction. During observations, the researcher took field notes about the strategies observed and focused mainly on the teacher. The information gathered from both the interviews and the observations was used to see how the instructional strategies with visuals align with the current literature.

Results and Conclusions

The researcher found that teachers' interview responses and observation results demonstrate that they consider visuals to be an integral part to the instruction of Spanish. Based on interview results, six of the teachers use visuals approximately 50-75% of their class time, and the remaining four teachers incorporate visuals about 25-50% of class time. These percentages suggest that the participating Spanish teachers consider visuals to be an integral part of their instruction.

The data collected also suggests that the participating Spanish teachers use various types of visuals for many different topics of instruction such as grammar, vocabulary, speaking activities, listening activities, reading activities, culture, history, partner/group activities, homework/project assignments, and general instructional presentation. Visuals are used in instruction for a variety of reasons, but primarily to help improve students' comprehension by reinforcing their learning.

The researcher discovered that the most common uses of visuals were to introduce vocabulary or grammar activities and to elicit written or oral student responses. Another popular use was to give students a visual (picture, graphic organizer, etc.) before doing a listening, reading, writing, or speaking activity in order to help students activate schema and prepare for the upcoming information.

In conclusion, the researcher found that visuals are used for many purposes to reinforce student learning, especially to reach diverse learners and to provide an alternate representation of the content. Although teachers implement visuals often, several challenges prohibit them from using visuals as much as they would like to in their classrooms. The teachers agreed that the most troublesome challenges are: having a place to store their visuals, having a way to organize their visuals, knowing what visuals they have, where the visuals are located, and the time constraints involved when searching for or creating visuals. Amongst all of the challenges, the researcher found that

the teachers remain determined to use visuals because they are essential part of their daily instruction.

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Instructional Strategies that Promote Listening Comprehension in Secondary French Classes

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Introduction

Proficiency in a foreign language is essential for communicating with people of other language groups in a global society. Curtain and Dahlberg (2005) describe the organizing principle of communicative language proficiency as “meaningful communication in the context of a holistic approach to learning” (p. 24). In 1996, the American Council on the Teaching of Foreign Languages (ACTFL) developed *Standards for Foreign Language Learning: Preparing for the 21st Century* as a national education initiative to set content standards for foreign language education in the United States (ACTFL, 1996). The national standards provide a framework for the foreign language content knowledge students should possess in five goal areas: Communication, Cultures, Connections, Comparisons, and Communities. Of these five areas, Communication is the core of foreign language study, as it provides the means by which students can access the other four. Listening comprehension is a fundamental aspect of foreign language proficiency and is essential to being able to communicate with native speakers effectively. In this way, the need for effective listening comprehension instruction is integral in developing students’ proficiency in K-12 foreign language programs.

Review of Literature

In the 1970’s, research in the field of psycholinguistics supported holistic, communicative language ability and the premise that language acquisition is necessary to develop foreign language proficiency. In the mid 1980’s, Tracy Terrell’s Natural Approach to second language acquisition called attention to the process involved in developing language ability in “natural, communicative situations”(Krashen and Terrell, 1983, p.19) and that the focus is on *what* is being said instead of *how* it is being said. Furthermore, the Natural Approach suggests that adequate input of the target language is

necessary for comprehension to occur. Krashen's Input Hypothesis (Krashen and Terrell, 1983) states that language is acquired when one is exposed to comprehensible input that is slightly above the level already acquired. In a proficiency-oriented classroom, the teacher speaks in the target language as much as possible and on a level slightly higher than what students already know (input+1) which provides the context for communication. Feyten's research (1991) revealed that there is a significant positive relationship between listening comprehension ability and foreign language acquisition, indicating that listening ability is an extremely important factor in the acquisition of a foreign language. Therefore, the use of effective teaching strategies to promote listening comprehension, combined with as much exposure to the target language as possible, is an essential aspect of language acquisition in the proficiency-oriented foreign language classroom.

Foreign language teachers should frame listening instruction in a manner that facilitates comprehension of the presented passage. According to Dunkel (1986), foreign language teachers should address three stages of listening: 1) pre-listening; 2) listening; 3) post-listening. Pre-listening activities should provide background knowledge and context for the listener in preparing to listen to a message. Additionally, as students listen to a passage, they should have a clear purpose that focuses on comprehension of meaning. Post-listening activities should provide an opportunity for students to respond to the passage in a way that demonstrates understanding.

In conjunction with these three listening stages, teachers should employ strategies that help make input comprehensible and aid students' listening ability. Research suggests that both input organization and background knowledge of the topic are factors that affect the comprehensibility of input and aid in comprehension (Anderson and Lynch, 1996). This implies that listeners will understand and recall information more easily if the content of the passage is familiar to them and that schematic processing and contextual understanding facilitate comprehension. Listeners call on both linguistic and non-linguistic knowledge as well as background information related to the message they are hearing in order to gain meaning. According to Curtain and Dahlberg (2004), the use of visual aids such as graphic organizers and pictures to accompany listening instruction can assist students in organizing ideas and relating them to meaning. This process

facilitates comprehension and recall of information more effectively because it can link linguistic and visual representations of the input in a way that is cognitively engaging. The use of visual aids and activities that activate prior knowledge contribute to creating a meaningful context within which a listening activity should take place. Furthermore, integrating multiple listener responses and assessment techniques in listening activities allows and even encourages multiple repetitions of a single text for different listening purposes. Each time a text is heard, the listener can acquire new information and apply it in a different way, which solidifies the context and meaning of the text and expands the listener's comprehension abilities (Lund, 1990).

The purpose of this study was to investigate instructional strategies used by secondary French teachers to develop students' listening comprehension ability at different levels of the secondary program. This study also examined how secondary French teachers' instructional practices align with current foreign language research.

Methodology

During the fall of 2006, the researcher conducted a two-part study involving eight secondary French teachers in a school district in central North Carolina to investigate instructional strategies they use when teaching listening comprehension. After receiving permission and informed consent, participants were interviewed using a researcher-designed instrument about strategies they use to teach listening comprehension. Each interview lasted approximately one hour and was audio-taped for later reference. Following the interviews, the researcher observed one class of each of the teachers in order to observe listening comprehension strategies identified in the interview. Teachers were asked not to modify their regular instructional techniques in order that the researcher could study their everyday teaching practices. The researcher took detailed field notes during the interviews and observations.

Results

All of the data collected during the interviews and observations was synthesized and analyzed to examine specific instructional strategies the teachers use in their daily teaching practices to promote listening comprehension ability in the secondary French classroom. Three middle school teachers (A,B, and C) and five high school teachers (D, E, F, G, and H) participated in the study. The following results come from this analysis.

During the interviews, all eight teachers stated that they felt listening comprehension is a very important part of teaching French. However, there was a significant disparity among the teachers regarding how they approached listening comprehension during the observation periods, especially in the amount of French they used during instructional time. This varied from approximately 25% to 100% of instruction time, and the researcher feels that this disparity is most likely due to the teachers' backgrounds in methodology, their teaching philosophies, lack of awareness about how to frame instruction in French at lower levels of the program, and that providing explanations is easier to do in English. Additionally, in comparing interview and observation results, the researcher noted that teachers tended to underestimate their use of English and of informal communication tasks during instructional time. This reduces the amount of French students are exposed to, thus limiting the number of opportunities to develop students' listening comprehension and proficiency.

In general, the researcher feels that teachers framed listening comprehension activities in a manner that is consistent with current literature and research. The researcher found that most teachers engaged students in pre-listening activities which were varied and included reviewing the main ideas about the topic of the activity, providing vocabulary activities, and asking questions about the topic of the activity. The researcher found that all teachers employed a variety of activities to accompany listening comprehension tasks including listening for the gist, clue searching, graphic fill-ins, dictation, inferential listening, instructional games, and matching descriptions to pictures. All observed listening activities pertained to familiar topics for the students, either through previous and current instruction or general knowledge. Moreover, the researcher observed most teachers using visual aids during instruction for the purpose of listening comprehension. Finally, most teachers who used recordings in instruction repeated the passage at least once which helps students clarify meaning, get missed information, and listen for different aspects of the passage. The use of pre-listening activities, familiar topics, varied listening activities, visual aids, and repetition of information all help activate students' schema, organize input, and reinforce the content information.

In examining post-listening activities and assessment practices, most of the teachers informally assessed their students by mixing a variety of tasks that incorporated both oral and written assessment. The researcher believes that, in general, the observed teachers evaluated students' comprehension in a way that is consistent with current research which advocates the use of a variety of assessment techniques to address the needs of diverse learners. This gives students the opportunity to demonstrate their comprehension of the listening passage in multiple ways that evaluates their knowledge and reinforces comprehension of the passage content.

Conclusions

Because the researcher observed each teacher only one time, the researcher feels it is difficult to draw firm conclusions about the teachers' instructional practices concerning listening comprehension. This study indicates that the French teachers interviewed conduct instruction in a variety of ways based on their personal preferences, teaching style, personality, training, and teaching philosophy. The researcher also feels that while teachers generally frame listening comprehension activities as research suggests, they do not always seem to frame it purposefully in regards to proficiency outcomes, which is often reflected in the use of English during instruction. Some teachers in this study relied heavily on English for communication tasks that the researcher believes could have been conducted in French. Second language acquisition research advocates the use of as much of the target language (French) as possible during instructional time so that students are exposed to as much comprehensible input as possible. Reliance on English during instructional time limits the amount of input in the target language that students are exposed to and hinders the language acquisition process. Lack of knowledge of best practices based on current research, insufficient time to plan effective lessons, and limited resources may hinder teachers from being able to use these strategies during instructional time and frame listening activities purposefully. However, using well-designed instructional strategies for listening comprehension purposes will aid students in the development of their overall proficiency in French.

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Document Analysis or Making the Grade?

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Introduction

To study history, historians analyze primary sources—artifacts from the past which provide firsthand knowledge of historical events (Wineberg, 1991). History classes at the university level develop the critical thinking skills necessary to analyze documents and participate in the process of historical inquiry. The Advanced Placement Program offers several classes to advanced high school students which afford them the opportunity to place out of college history courses by performing well on a standardized test—the Advanced Placement, or AP, exam (College Board, 2005). One of the questions on the exam tests students’ ability to analyze documents and use their analysis to create a historical argument. This question is called the Document-Based Question, or DBQ. In theory, the DBQ is a test of critical thinking ability—however, its distinctive nature may render it an easy question to “beat” by teaching test-taking strategies instead of critical thinking. The question which this study seeks to answer is: Do AP history teachers teach critical thinking skills and document analysis to their students, or do they teach test-taking strategies designed to manufacture high scores on the DBQ?

Review of Literature

In his taxonomy of educational objectives, Benjamin Bloom (1956) ordered levels of critical thinking ability into a hierarchy which enables teachers to both recognize their students’ ability levels and to gear instruction toward moving them up the hierarchical ladder. The taxonomy explains the process by which a student first learns to accurately recount the ideas of others, then to understand the ideas, and then to create original ideas—a process often cited as the goal of social studies education (Dyneson & Gross, 1995). According to Milton (1993), students’ critical thinking skills tend to be largely undeveloped when they arrive in high school, presumably because pre-secondary social studies education emphasizes memorization. However, scaffolding critical thinking skills

has proved effective in ninth grade history classrooms in Milton's study. Other research indicates that, while critical thinking can and should be integrated, existing teacher paradigms preclude the effective inclusion of critical thinking exercises into the classroom (Mintrop, 2004).

Though many history teachers understand that primary source use distinguishes the study of history from other social studies disciplines, there is nevertheless a divide between the way historians study history and the way that teachers teach history. Mayer (2003) highlighted the deficiencies displayed by pre-service teachers in the way that they conceive of history, and suggested the positive impact which a deeper personal understanding of history can have on young teachers. However, research has demonstrated that many teachers do not align their values with accepted values of historical study (Goodman & Adler, 1985).

On the other side of the chalkboard, research indicates that students struggle with analysis of primary sources. Wineberg compared students' abilities with those of historians in this arena, and found that there was a huge disparity between historians and students in what he called "syntactic knowledge," referring to the fifth of the six levels of Bloom's taxonomy (1991). Why this deficiency in student proficiency with regard to primary sources? It is certainly not a case of students being pushed beyond their abilities—research indicates that students are not only capable of working with primary sources when they are guided through the critical thinking process, but that primary source exposure actually enhances their enjoyment of history classes (Epstein, 1994, and Goldenberg & Tally, 2005). Thus the research seems to indicate that instruction in critical thinking skills through the use of primary documents ought to be an integral part of the history classroom. The DBQ was created with this fact in mind. However, the question remains: Do teachers faced with the DBQ as an assessment teach critical thinking and document analysis?

Methodology

The subjects for this study were three Winston-Salem/Forsyth County AP History teachers, chosen based on their availability and willingness to participate. Students' names were not known to the researcher and observation did not include evaluation of

student involvement or knowledge. Test scores were not examined. Teachers' names and information were kept strictly confidential.

This qualitative study was based on classroom observation of the three aforementioned history teachers. Notes detailed how much time teachers spent discussing document analysis and historical inquiry, and how much was devoted to the DBQ as it exists on the AP Exam. The Goldhammer note-taking system was used, with observations analyzed for trends, which are reported below (McNergney & Carrier, 1981).

Analysis

The researcher observed three teachers—labeled “A,” “B,” and “C” to preserve confidence—for seven, seven, and six hours, respectively. The data collected began to reveal patterns during the course of observation, and so the researcher focused in on collecting specific evidence of critical thought and the inclusion of primary sources in the classroom.

The collected data revealed two major trends. The first trend is that the AP teachers observed did not incorporate documents into their instruction regularly, and the second is that lessons which did involve document analysis were generally related to DBQ preparation. Of the three teachers involved in the study, one (Teacher B) used documents exclusively in the form of DBQs assigned to be completed at home. This teacher also gave students a self-assessment to complete outside of class. The components of this self-assessment line up identically with the rubric for the DBQ portion of the AP exam.

Teacher A's use of documents in the classroom was similar to Teacher B's. He, too, assigned take-home DBQs to his students. However, the researcher also observed one document-analysis exercise which Teacher A did in class. It became apparent during the course of the lesson that the instructor was interested in very narrow interpretations of the documents being examined, which would only be useful within the context of the DBQ. This prompted one student to complain, “I don't know what you want me to say,” after her interpretation of a document was rejected.

The third teacher (Teacher “C”) devoted two entire class periods to primary document analysis and a third period to writing a DBQ response in-class. One of his lessons utilized documents as tools for learning history with no reference to the DBQ.

His second lesson used documents as part of a DBQ prep in a manner similar to Teacher A. On the whole, this teacher made the most diligent effort of the three to scaffold document analysis for his students. However, even he frequently ended up answering his own questions because of dissatisfaction with the answers which students provided.

Implications

My research indicated that classroom preparation for the DBQ tends toward teaching students how to do well on the AP exam, rather than teaching them critical thinking and inquiry skills. The clear implication of this finding is that the inclusion of the DBQ on the exam fails to hold teachers accountable for teaching critical thinking and document analysis to their students. This seems to render the AP exam and in turn the program itself a means to college credit, rather than a means to higher order thinking skills in students.

Conclusions

The data collected in this study reflects the classrooms of the teachers whose classes I observed, but the implications of the data extend beyond the classroom. Teacher B commented on one occasion that the essay grades he assigned reflected success at essentially writing a form essay rather than essay quality. This reflects the value which the AP program itself tacitly espouses in the way that it assesses the DBQs and essays on the AP exam—namely, with a rubric more concerned with form than with content or style. At some level, of course, the responsibility for buying into this value must rest with the individual teacher, who alone can control what instructional methods he uses in his classroom. However, as long as the test itself is designed in such a way that it rewards poor teaching, poor teaching will continue. Changes in the way the system works must coincide with a commitment to better instruction for a lasting impact to occur.

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Accountable Talk Benefits for Peer Communication

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Introduction

Teachers struggle daily to find ways to engage the attention, memory, and critical thinking of students. Because the average attention span of a student is less than a minute, (Sloan, lecture, May 2006) teachers say they try to keep the class interesting and quite active. Much research, however, shows that though many of today's teachers desire their classroom to be student-centered, the teacher talks for well over half the class. Because this is often the case, the question poses itself – Do students pay attention to the answers or comments their peers offer in class? Does the teacher do anything to facilitate the attention and in turn, hopefully the achievement of those students not speaking up in class?

Review of Literature

Many of today's high school teachers tend towards lecture-style teaching, whether they are partial or full lectures. This comfort zone that many teachers like to work in, when used to facilitate student thought and comments (a type of partial lecture referred to as recitation lecture), can be beneficial to those students who pay attention and offer answers. Still, educators must consider the engagement of *all* students. The following study will observe nine specific teacher responses used to engage their whole class, even those students who are NOT prone to offer remarks or answer questions.

Because silence can be a source of insecurity, teachers may command most of the talk time in the classroom. Beach and Marshall encourage teachers to anticipate student response in order to develop lesson plans. (Beach & Marshall, 1991) This, however, encourages teachers to structure their lessons around pre-conceived ideas rather than formulating open-ended questions and expansive responses that would allow for increased student expertise and talk. Indeed, most classrooms are run in such a way that conversation continually reverts back to the teacher, both because the teacher promotes or

allows it, and because that is the learned response of students. (Beach & Marshall, 1991) The most commonly recorded pattern of discussion in the classroom is “teacher-student-teacher-student” with very little concrete, expanded feedback. (Burns & Myhill, 2004, p. 9) If achievement is not significantly rising for all children in the classroom then, is this approach truly valuable?

Rosenshine (1971) identify categories of teacher response that affect student achievement and notice that the greatest correlation is found when teachers accept student answers, more specifically through simple reflection. Still, confirmation of these findings is important so that teachers can actively engage in responses that will urge students to listen to one another and be able to support the answers they offer. In 1998, Mary K. Graciano conducted a study under the guidance of Dr. Joseph Milner that was concerned with “turn[ing] recitation into conversation.” (p. 56) Recitation lectures are those that generally result from close-ended teacher questions and drill-like environments with fill-in-the-blank prompts. Fast paced lectures such as these often disregard the disengaged student. Graciano suggests that the teacher ultimately set the tone for the class through his or her questions, responses, and feedback. (Graciano, p. 59)

The goal of any classroom should be to hold the students accountable not only for the information studied, but for discussions conducted in class. In order to prompt students into a deeper reading and a better understanding of their own thought processes, the teacher should engage them in “accountable talk.” (Milner & Milner, in press). The authors cite Michaels, O’Connor, Hall, and Resnick (2002) as the originators of this phrase as well as concrete actions to encourage this type of discussion. They list marking, challenging, modeling, recapping, keeping channels open, linking, clarifying, verifying, pressing for accuracy, and expansion as helpful teacher responses to student comments. Still, the question remains of how effectively non-responding students’ attention is directed to appropriate information and discussion. What does the teacher do to “modify” and “expand” the “social reality” of a classroom? (Nystrand & Gamoran, 1988, p. 8)

McKeown and Beck have been engaging in their project for seven years, which, among other objectives, aims to help teachers learn how to respond effectively to their pupils. (2003) The two major ineffective teacher responses found were those that simply

collected the information given and those that geared the teacher toward discussion overtake. They admitted, “The toughest issue ... is to treat students’ comments in such a way that they invite other students to extend and elaborate on them, moving the discussion forward in meaningful ways.” (McKeown & Beck, p. 3) They recommend revoicing and turn-back as effective techniques. Revoicing paraphrases the student’s response; whereas turn-back redirects the question back to the class. Truly, the hard work becomes the questioning and response techniques rather than lecture strategies.

Methodology

Statement of the Problem

What is the effect of teacher response to student comments, during recitation lectures, on class attention?

Participants

Participants for this study will be four different Master Teachers and their students at a Forsyth County High School. Each teacher will be observed for 10 hours, totaling 40 hours of observations in all.

Procedure

During the 40 spent by the researcher in the classroom, she noted different signs of interaction/attention that students exhibit when their peers talk. The main framework was based on the ratio of student’s noticeably NOT paying attention out of the number present. At the beginning of the class the researcher recorded the number of students present and relied on that number and the number of students NOT paying attention for the analysis of her results. This technique allowed for a quick and convenient recording process, and in turn allowed for an increase in her attention focused on observation rather than on note-taking. The number of inattentive students was recorded opposite the teacher-response method used when a student offered or is asked for commentary on the topic being discussed. The count occurred after every teacher response. Teacher responses were categorized in 9 different ways: humor, keeping channels open (Did you hear what ‘John’ said?), turning the question back to the student who offered the comment, turning the question back to the whole class, repeating or rephrasing the answer given, affirmation, silence, teacher expansion of student ideas, and rejection or correction. (adapted from Michaels, O’Connor, Hall, and Resnick, 2002)

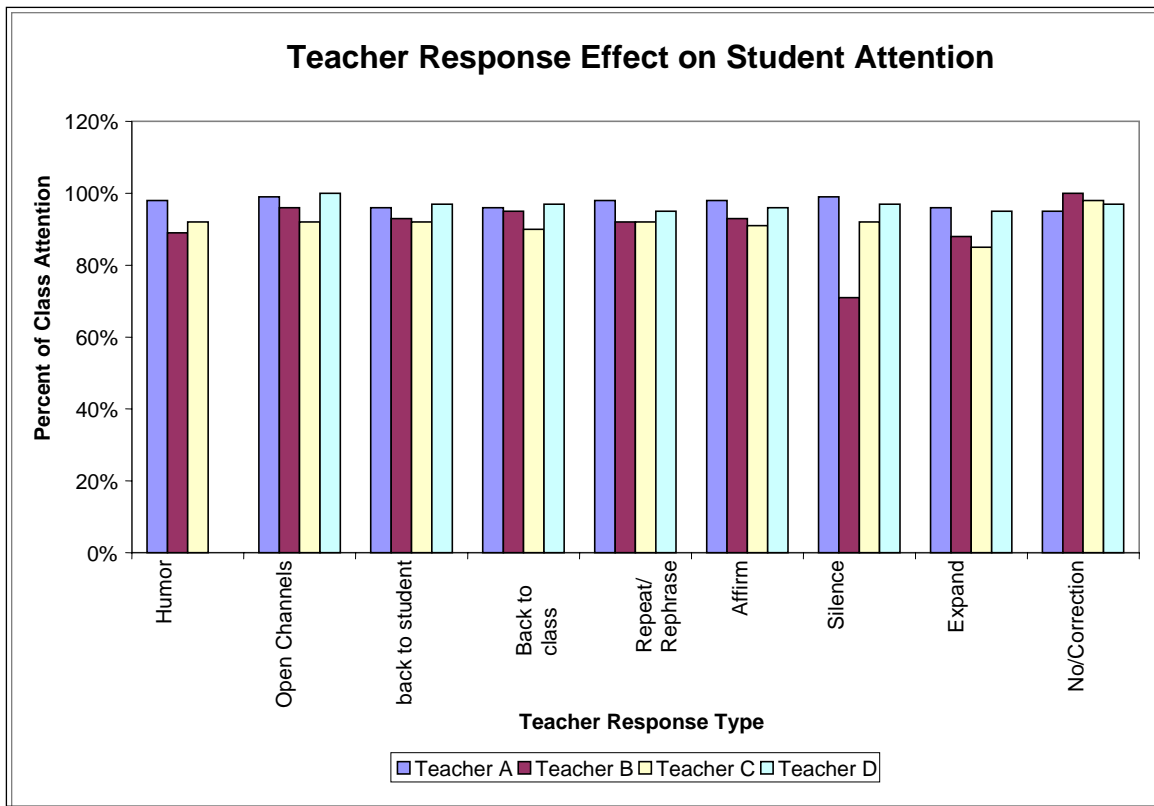
In addition to the student counts, the researcher recorded all that she noticed pertaining to student attention or non-attention during recitation lectures (partial lecture style where teacher talks and periodically allows or prompts student response). Such non-attentive actions included doodling, spacing out, sleeping, talking, reading, flipping through papers, head down on desk, etc. Because most students are trained to respond to the teacher rather than fellow students, the researcher also noted whether students seemed to be paying attention to and responding to the teacher's responses or directly to their peers' comments.

Results and Conclusions

In order to review the data recorded in the classroom and identify trends in the results, the researcher entered all data into Microsoft Excel. The program allowed the creation of data tables and graphs and provided average percentages for various teacher responses. The data recorded was translated into many graphs considering different aspects of comparison. The main graph which identifies each teacher, their responses and the percent of student attention held with the reply is shown below.

Through close analysis of the graph and others generated by the researcher, it is obvious that students in this school paid attention relatively well. Most of the teacher's response-acts generated above 90% of the class's attention. The act receiving the highest percentage when all teachers were averaged for each act was rejection/correction. In today's society, teachers are usually encouraged to redirect their student's wrong answers rather than dismiss them. The findings of this study, however, suggest that student attention is increased by the use of rejection or correction. Still, the results of this study are not conclusive as only four classrooms in one high school were observed, not allowing for enough data to make any definitive conclusions.

On the other hand, the data shows that the four teachers in the high school studied are more or less personally effective when they employ strategies that compliment their individual personalities. Though Teachers A and D both averaged a class attention high of 97%, each teacher excelled in making a particular strategy work for his or her teaching



style. Teacher A scored highest by keeping channels open and with the silence category; Teacher B maintained student attention best when correcting or rejecting a student’s answer; Teacher C did well to keep the students focused also by rejecting or correcting a student’s answer; Teacher D was most effective concerning student awareness when keeping channels open for further class discussion.

These averages, though clearly pictured in graphs and seen in the data, can not be conclusive because of outside factors that may have affected student attention such as personal concerns, classroom temperature, health, or any number of other influences. In addition, many of the teacher-response categories that the instructors averaged well in occurred in categories that accumulated less data than others. For example, Teacher A very obviously employed humor almost every class period in order to direct student attention to the discussion of the classroom. The data, however, shows that the teacher elicited pupil awareness more effectively with silence and open channels. This discrepancy in data and perceptions may be due to the researcher’s false deductions or a direct result of an unequal number of occurrences among the different teacher responses.

Other data considered was the comparison of the effectiveness of teacher responses in separate grades and different academic levels. Advanced Placement students paid better attention across the board, no matter what response their teacher offered, than any other level. Honors students didn't respond well to humor, and the Academy (below regular) students seemed to understand teacher silence to mean that their attention was no longer required. Freshman seemed to respond well to the opening of conversation channels, whereas Juniors and Seniors seemed to perform better when teachers corrected or rejected their initial answers.

The possibility for further research is what makes this study exciting and applicable. Though the results cannot offer any concrete conclusions at this time, an increased number of observations utilizing many more schools, students, and teachers could help the researcher weed out other contributing factors that may influence teacher-student interaction as influenced by the nine responses of this study.

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Students' Questions in the Secondary Social Studies Classroom

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Introduction

Ask a group of teachers about questioning in their classrooms and they will likely respond by talking about the types of questions they ask, how often they ask questions, or the responses they get from students. The assumption here is that teachers ask questions and students answer them, not the other way around. This emphasis, both in the research and in classrooms, on teacher questions is rarely examined, possibly because it is so ubiquitous. However, the fact that it seems normal does not mean it is a good practice. In fact, the preponderance of teacher questions and the lack of student questions seem to fly in the face of logic. If teachers possess the knowledge and skills that students need to acquire, why should teachers be asking all of the questions?

Review of Literature

Examining questions on a theoretical level, J.T. Dillon (1986) explains how questions are at the heart of learning and that it is therefore desirable for students to ask questions. Scardamalia and Bereiter (1992) drew an important distinction between two types of student questions: "text-based" and "knowledge based." Text-based questions are usually generated after exposure to a text and occur because students are required to generate questions. The majority of the research on student questioning focuses on text-based questions.

Knowledge-based questions, on the other hand, occur spontaneously and are usually asked in advance of or during instruction. In this case, the student asks the question out of a genuine desire to know the answer rather than because it was required by the teacher. Knowledge-based questions are what one normally imagines when one pictures a student asking a question: a verbal question addressed to the teacher or to classmates. Why does the distinction between the two types of questions matter? Text-

based student questions improve comprehension and recall and require thinking on the part of the student. Knowledge-based questions share these benefits and have additional advantages.

First, knowledge-based questions can contribute to classroom discussion. Dillon's (1986) model of questioning says students generate questions based on the answers to previous questions. For this to occur, students must share their questions and answers with each other. In the classroom, this is done verbally through discussion. In practice, knowledge-based questions do enhance classroom discussion. Nystrand and colleagues found that student questions are the most important component of authentic classroom discussion because they create substantive interaction among the students and the teacher (Nystrand, Lawrence, Gamoran, Zeiser, & Long, 2001; Nystrand & Gamoran, 1991).

Second, are asked before or during the learning activity and therefore reveal the state of the questioning student's prior knowledge. According to Dillon's model, a teacher can use the insight into prior knowledge provided by the student's knowledge-based question to correct misconceptions. This idea is confirmed by the research of Knapczyk, who found that students' questions provide instant feedback to the teacher (Knapczyk, 1989; Knapczyk & Livingston, 1974).

Knapczyk found two other benefits of knowledge-based questions (Knapczyk, 1989; Knapczyk & Livingston, 1974). The first is so intuitive that it is easy to overlook: information acquisition. When students ask a question aloud in class, they receive an answer, which adds to their knowledge base. The second benefit is improved achievement; grades improved for students who had been trained to ask questions in class.

Other studies have focused about the frequency of knowledge-based questions, i.e., those asked in the classroom. This research was succinctly summarized by Dillon (1998): "No one has ever gone into a sample of classrooms and found a lot of student questions. On the contrary, investigators can scarcely find any..." (p.199). This assessment applies to his own study in which he analyzed transcripts of 1-hour class periods in different in 27 different classrooms. The results showed that students collectively ask about two information-seeking questions per period and that only 1% of students ask questions. Susskind (1969, 1979) in elementary classrooms and Fahey

(1942b, cited in Dillon, 1998) in secondary classrooms each observed two questions per class hour from students and more than 80 from the teacher.

The purpose of this study is to extend research on knowledge-based questions into the secondary social studies classroom and to answer the following questions:

- Are student questions as infrequent as previous research suggests?
- What affects the frequency of student questions?
- What can teachers do to cause students to ask more questions?

Method

Participants

The subjects were four social studies teachers in public high schools in a suburban Southern school district. The teachers were selected through convenience sampling and through recommendations from cooperating teachers in a secondary education program.

Data Collection

Each of the four teachers was observed for six or seven 1-hour class periods over the course of a 1½ month period. The data in the study was recorded in writing during these observations. In each class period, two types of data were recorded: students' questions and phenomenon that might affect students' questions. The observation instrument was devised based on the variables of interest: students' questions, context of the questions, and time.

In one column of the observation form, the researcher recorded the activity of students and teacher occurring in the classroom. The observations focused on anything that the researcher believed might affect the frequency of student questions. In another column, the researcher recorded the type of each questions. Each question was coded as one of five types: random, procedural, task-related, knowledge-based (lower-order thinking), or knowledge (based higher-order thinking). A third column of the observation form was left for reflection and speculation. As the researcher was recording questions and other phenomenon, he could also record thoughts about what may have caused these questions to occur when they did. The fourth column of the observation form was for the time at which the events in the first two columns occurred.

Results and Implications

This section summarizes the major findings of the study and suggests implications for teachers and future research.

Social studies students asked few knowledge-based questions in the classroom.

This finding is consistent with the existing body of research on student questions (Dillon, 1988; Susskind, 1979). The major limitation of this study in measuring the frequency of student questions was that only 25 class periods were observed. Because such a large number of variables could potentially affect student questioning, it is difficult to generalize based upon the results of this study alone. However, since other research has had similar results, it seems safe to conclude that students generally ask few knowledge-based questions. The implication for teachers is that if they want students to ask questions (and they should), they may have to actively use strategies to cause students to ask questions.

This study's design of observing a small number of periods made it easier to identify patterns of questioning within individual lessons but more difficult to identify broader trends. Larger studies are needed in the area of student questions to determine what sorts of things cause students to ask questions. Future research, similar in design to this study but with many more classroom hours observed, might be able to more conclusively determine why students do or do not ask questions. Is it an inherent quality of the students? Is it something that certain teachers do? Is it the culture of the school? These types of questions were beyond the scope of this study but could be answered by a broader quantitative study.

Students asked as many procedural questions as knowledge-based questions.

This may explain why teachers think students ask more questions than they actually ask (Dillon, 1988; Susskind, 1979). If teachers believe their students already ask questions frequently, they have no incentive to incorporate new strategies into their teaching to cause students to ask more questions. Teachers should pay attention to the number of procedural questions that their students ask and be mindful that these questions, unlike knowledge-based questions, do not reflect learning on the part of the students.

Unmonitored students asked fewer questions.

Although previous research has not focused on how monitoring might affect student questioning, it seems logical that students would be more likely to ask questions if the teacher is physically near them and expressing an interest in their work. Future research is needed comparing the frequency of student questions between monitored and unmonitored students who are working individually or in groups. In the meantime, teachers are encouraged to walk around the classroom and actively monitor students working independently or in groups. While monitoring, teachers could even go so far as to ask students if they have any questions.

Students asked fewer questions in review lessons.

Again, previous research on student questions has not specifically focused on this aspect specifically. However, it seems logical that in a review for a test, students would be more interested in discovering which content will be on the test than in understanding or thinking deeply about that content. Further research on the effect of “review” on student questioning could address whether all types of review are correlated with fewer student questions. It seems possible that certain review activities might require more thinking and more engagement on the part of the students and therefore result in more questions from students. Based upon the results of this study, teachers are advised to plan review lessons that are student-centered, engage all students, and demand critical thinking.

Students asked more questions in lessons addressing the topic of slavery.

Due to the time of year when the study was conducted and the social studies curriculum in North Carolina, many of the observed periods had slavery as a topic. Future research at other times of the year could determine whether other topics also produce more student questions; it seems unlikely that slavery is the only such topic. Until such research occurs, it is difficult to conclude what it was about the issue of slavery that causes student to ask more questions. Did the horrors of slave conditions emotionally affect the students? Did students have more prior knowledge about slavery than about other topics? Were students aware of racial problems in society that continue to this day? While these questions cannot be answered by this study, teachers should be aware that certain topics may produce more student questions than others do. With this in mind,

teachers should try to identify question-producing issues and look for ways to include them in their lessons.

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Engaging the Disengaged

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Introduction

Student engagement is a persistent problem in America's schools. Apathetic students dominate the classroom; students rarely engage with the teacher or material being taught. In order to combat apathy and disengagement, it is necessary that educators understand the depths of the issue. The study focused on the instructional methods that lead to student engagement, such as whole class instruction, individual instruction, and group work. Whole class instruction included discussion, whole class reading, mini-lessons, and review. Within the individual instruction, in-class writing, self-editing, and worksheet/bookwork were examined; as well as, cooperative learning and presentations which created the group work category. The study specifically investigated the engagement of the students by how well students respond to the instructional methods in terms of their participation and focus.

Review of Related Literature

Hudley, Daoud, Hershberg, Wright-Castro and Polanco (2002) stress that student achievement directly affects student engagement; "...high levels of achievement will implicitly demand high levels of academic motivation and engagement on the part of the students" (p. 3). Zohar and Kravetsky (2003) find that students of high-performing ability respond well to instruction that induces cognitive conflict; however, low-performing students achieve at a greater level when direct teaching is the chosen instructional method. Greenwood, Horton and Utley (2002) suggest that students' academic skills learned are defined by the interplay of everyday experiences, such as the teacher's ability to motivate students.

The notion that teachers directly impact student engagement is also seen in the study by Catlin, Lewan and Perignon (1999) who find four main explanations for disengagement. Students' educational decisions, attitudes, family issues and societal

issues, such as peer pressure, impact student's level of engagement. The researchers find that teachers' choices, such as assignments and instructional methods, correlate with levels of student engagement. Based on their data, student engagement greatly increases when teachers participated in specific lesson plans and activities. Catlin, et al., as well as Cluck and Hess (2003) find cooperative learning and multiple intelligence activities allow students choice in assignments, assessments and even partners greatly impact the amount of engagement present in each classroom. King, Schroeder and Chawszczewski (2001) and Marks (1995) suggest that when teachers create more authentic assessments, students, in return, produce more authentic work, thus positively affecting student engagement.

Hudley's et, al. (2002) find that a student's perceptions of their school abilities and a student's efficacy to performing learning tasks affect the level of engagement of a student, as well as attitudes toward the school climate. They also find that perceived teacher support plays a large role in a student's engagement in the classroom. Marks's (1995) findings also show the increase in student engagement when students have strong support in school and within the classroom.

Methodology

Protocol for Observation

For the completion of this study, the researcher implemented a qualitative research study. To effectively evaluate student engagement, the nonparticipant observation technique was applied as the researcher observed the classroom but refrained from any interaction or participation with the teachers or students. The researcher completed extensive field notes that provided descriptive information concerning what the researcher observed, including the instructional methods and the students' participation and behavior. While observing each classroom, the researcher examined the teacher's instructional methods and the student's behavior.

Observation Participants

The researcher observed four English classes instructed by teachers at East Forsyth High School, including Teacher A's Advanced Placement English class (20 students), Teacher B's English II Honors class (24 students), Teacher C's English IV regular class (25 students), and Teacher D's English II Honors class (25 students).

Data Collection

The researcher examined the behaviors and decisions of the teacher, as well as holistically examining the level of engagement among the students. It was essential for the researcher to refrain from creating any bias or preconceived notions concerning the class, teachers, or students she observed. The researcher approached each class observation with no reference to past observations or previous events that might have occurred.

To effectively monitor the events within each class to conclude how daily classroom activities and instructional methods affect engagement, the researcher created a template with which to collect data. The researcher focused on two main categories, including the learning activity and student engagement. The activity section housed descriptions of the classroom assignments, lessons, topics, and instructional methods. The engagement section contained information concerning specific students' behavior, in addition to the general class engagement, such as participation, sleeping, and talking to fellow students.

After ten hours observing each teacher, sufficient data was collected for the study. Using the described template, the researcher took extensive notes for each class period. A thorough description of the instructional activity and noteworthy teacher behavior was recorded. To record the appropriate levels of student engagement, the tally marking system was implemented. The number of students with their heads down on the desks, those sleeping, those passing notes, or the students talking to their neighbors was recorded using tallies and a description of their actions was noted. The students' behavior was recorded in direct relation to the activity, instructional method, or lesson used at that time.

Data Analysis

In order to present common themes and patterns, the evidence was coded by category. The instructional methods among all teachers were totaled to find the most used methods and activities observed during the study. The common patterns among the activities and behaviors of teachers were analyzed, as well as the engagement level of students in relation to the teachers' decisions. The recordings of disengagement were compared to the number of students in the class to find the percentage of engagement that

was occurring during the class period. The final results were determined after finding the average percent of engagement during all of the specified teacher's occurrences of a particular activity.

Results and Conclusion

The results varied greatly among teachers and instructional methods, divulging no overwhelming conclusion to be said for all teachers in regards to specific activities implemented during class. Discussion was the only instructional activity implemented by all four teachers, which results from the nature of the English classroom. As the data shows, all teachers had extremely varied results in terms of student engagement for discussion. While Teacher A had 90% engagement, Teacher B with 31%, Teacher C had 25% student engagement, and Teacher D had 75%. The whole class reading showed to have relatively high student engagement with Teachers B and C having 75% and Teacher D having 100% engagement. The researcher noticed that when students were randomly called upon during the class reading, students were more engaged.

The mini-lessons, implemented by Teacher B, with 78% engagement, and Teacher C, with 92% engagement, appear to engage students when student engagement is relatively low for many activities within these classes. The reason for this engagement can not be determined; however, the researcher noted that both teachers used relevant and modern examples during the mini-lesson, constructed to aid students' understanding. It was noted that Teacher B used humor throughout the mini-lessons.

Teacher D had 100% student engagement during reviews of quizzes, while Teacher C had 33% of engagement. It was noted that Teacher D used humor during the review.

When teacher B employed the individual assignments of writing and self-editing, the teacher had the greatest engagement for her class compared to the other activities observed. It is assumed that Teacher B's honors class actively participates in assignments that will be turned in to the teacher and graded. Teacher A had 54% engagement during self-edit activities. Teacher C had 50% student engagement when doing individual worksheets. After observing the students in Teacher C's classes, the researcher believes that the overuse of the worksheets caused the disengagement of these

students. Repeatedly, students groaned when a worksheet was announced, and on one occasion, a student responded with “You’re killin’ trees!”

Cooperative learning and presentations had overwhelmingly positive engagement among students. Teachers A and B, both with 100% engagement, had students to use cooperative learning as a means to complete a product. Teacher A had 100% engagement during presentations. Teacher C, with 63% engagement, used cooperative learning for students to practice interviewing skills in partners. It is assumed that because a final product was not the goal of the activity in Teacher’s C class, like the activity in Teachers A and B’s classes, that students were less engaged.

The data reveals that there is not a specific instructional method that can be determined to create positive or negative engagement for all students, spanning all English classes. Engagement depends upon the activity and how a particular class of students responds to that activity. On average, students responded well to humor used by the teacher, thus, positively affecting student engagement as students became more attentive to the teacher. The use of relevant examples throughout discussion and mini-lessons also positively affected engagement, creating a link between the material and the students. It appears that the teachers observed know their students well and to what activities they respond. While engagement is not guaranteed with every activity the teacher applied, a correlation exists between the number of times the teacher used an activity and the level of engagement. A teacher would not use an activity rendering low engagement multiple times.

While the overarching question posed at the beginning of the research can not be answered, an important conclusion can be drawn from the observation of student engagement. It is critical for the teacher to understand the needs of his/her students, to know with what instructional activities they engage, and with what activities they become enthused. The researcher believes that engagement is a direct effect of what the students find important, such as grades and relevance. It is necessary for a teacher to be familiar and recognize his/her class’s personalities, and adjust lesson plans and instructional methods to meet the needs of the students to improve their overall educational experience.

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Vague Versus Specific Instruction and Its Effect on Student Output

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Introduction

The purpose of this study was to examine if and how English teachers use problem-based learning strategies, defined here as vague instruction, in the classroom. I hoped to see themes emerge concerning the amount of student output, or “on-task work,” because of the nature of the instruction as well as stimulation of higher-level thinking through group work. Secondary affects were the observation of the amount of vague or specific instructional use in the classroom, the amount of group work that took place in the English classrooms, the purpose of group work in the English classroom, and the level of progress obtained in these groups. Does one instructional method produce more collaborative efforts in a group situation over the other? Does one facilitate students to stay on-task more than the other?

The study was conducted in four high school English classrooms in Winston-Salem, North Carolina. I defined vague as, “explaining or communicating in a broad, extensive, or open way.” Specific was defined as, “precise and clear when making statements or issuing instructions.” Group work ranged from two students to any instance in which the entire class is collaborating together to reach a common goal.

Review of Related Literature

Many researchers believe that students work is largely guided by their instructors as they move through the learning process (Alutu, 2006). Alutu posits in his study that for efficient and effective teaching and learning to take place the instructor needs to guide the learners towards a common objective. I want to look at the spectrum of this “guiding” instruction in the classroom.

Rothkopf and Kaplan wrote in the *Journal of Educational Psychology* that providing explicitly stated objectives to students prior to instruction has been shown to increase the effectiveness of training (1972). Their study looked at reading comprehension and showed that more intentional learning, defined as relevant to the objective, resulted from specific rather than vague objectives. However, in another study I looked at, Reeve and Jang found that students were more “on-task” when they had more perceived autonomy in the learning activity (2006). This idea is associated with vague instructional methods.

I will be looking at the instructional method specifically for group work situations in my study. Social learning theorists such as Vygotsky and Bruner believe that learning takes place in collaboration with others. Many researchers believe that students are influenced by their peers. Ewald (2004) concluded that through group discussion of vague concepts “learners deepened their perceptions, modified their perspectives and even changed their small group behavior as a result of their collaboration and newly discovered sense of community.” Students “collaborate” to form ideas, feel a sense of “community” in this instance, and are able to achieve improvements in language learning through group work. Another study showed that children in structured groups were more cooperative and provided more verbal help and assistance to each other as they worked together (Gillies, 2003). More elaborative methods, then, translated into more learning by these students. These studies point towards the notion that collaboration with vague directions can lead to higher-level thinking results. Teachers play an important role in this type of instruction.

Methodology

This was a qualitative study. In this study, I observed four English classrooms, with varying numbers of students, at East Forsyth High School in Winston-Salem, North Carolina. Students ranged from grades nine through twelve. The classes observed were English I, English I Honors, English II, English II Honors, English III AP, English IV, and English IV AP. Participants were chosen through the Master Teacher Fellows Program affiliation with schools in Winston-Salem, North Carolina. Students were observed for a length of eight weeks, from October through November. Each classroom

was observed for no less than ten hours, so that the researcher gathered no less than forty hours of observable instruction. Only instances in which group work took place were reported in this study. I randomly alternated classrooms, class periods, and observation days. The identities of the teachers and the students will remain confidential and were not recorded.

The effectiveness of vague versus specific instructions was measured through non-participant observation. I recorded all instructions given to students in a field journal. Instructions included directions for in-class assignments, homework or out-of-class guidance, and in class discussion sessions in which the entire class was engaged in finding a common understanding of the text. “Instructions” were labeled on a continuum from vague to specific and any not clearly defined as either vague or specific were thrown out. If a teacher did not give specific instructions about how to complete an assignment, but simply gave an assignment, it was defined as “vague.” I recorded the size and nature of the groups in my field journal. Students were observed for reactions to teacher instructions and a tally was kept for as many groups (or students in whole class situations) as possible. Students were labeled as either “on-task,” “off-task,” or “indeterminate.” Indeterminate simply means that it is unclear whether they are on or off task. Further, groups were categorized as groups in which collaborative learning took place or groups in which collaborative learning did not take place. “Collaborative learning” was defined as any situation in which more than one student worked together to investigate an answer to a problem or task. Collaborative learning did not take place if students were in a group but worked individually to complete the task.

Results and Conclusions

Table 1: Group Work Characteristics with On-Task and Off-Task Instances Highlighted

<u>Group Work Characteristics</u>					
<u>Instance</u>	<u>Type of Instruction</u>	<u>On-Task, Off-Task</u>	<u>Collaborative Learning</u>	<u>Nature of Group</u>	<u>Course Type</u>
1	Vague Instruction	On-Task	no	2 groups of 4	Eng IV AP

2	Vague Instruction	On-Task	yes	1 group of 7	Eng IV AP
5	Vague Instruction	On-Task	yes (for 7 students)	1 group of 18	Eng III AP
14	Vague Instruction	On-Task	yes (for 11 students)	1 group of 22	Eng II Honors
17	Vague Instruction	On-Task	yes	4 groups of 2	Eng IV AP
19	Vague Instruction	On-Task	yes (for 13 students)	1 group of 24	Eng II Honors
21	Vague Instruction	On-Task	yes (for 13 students)	1 group of 23	Eng II Honors
3	Specific Instruction	On-Task	no	8 groups of 3	Eng II Honors
4	Specific Instruction	On-Task	no	5 groups of 2	Eng II
6	Specific Instruction	On-Task	yes	5 groups of 2	Eng II
7	Specific Instruction	On-Task	yes	12 groups of 2	Eng II Honors
9	Specific Instruction	On-Task	yes	3 groups of 6-7	Eng III AP
10	Specific Instruction	On-Task	no	3 groups of 6-7	Eng III AP
11	Specific Instruction	On-Task	yes	9 groups of 2	Eng I Honors
12	Specific Instruction	On-Task	yes	3 groups of 6-7	Eng III AP
13	Specific Instruction	On-Task	no	8 groups of 3	Eng II
15	Specific Instruction	On-Task	no	2 groups of 2-3	Eng IV AP
16	Specific Instruction	On-Task	yes	8 groups of 2-3	Eng I
8	Specific Instruction	Off-Task	no	1 group of 10	Eng II
18	Specific Instruction	Off-Task	no	6 groups of 2-3	Eng IV
20	Specific Instruction	Off-task	no	8 groups of 3-4	Eng II Honors
22	Specific Instruction	Off-Task	no	8 groups of 2-3	Eng II

In the forty hours of non-participant observation, I recorded 22 instances of group work. Of the 22 instances, 7 used vague instructional methods to guide the group and 15 used specific instructional methods. I recorded 4 out of 22 instances where students were largely off-task. Students were on-task in the 18 remaining situations. All four teachers used vague and specific instructional methods in their classroom. I observed group work scenarios at least one time in all of the types of classes (Eng I, Eng I Honors, etc.). Group work resulted in collaborative learning for 12 of the 22 instances.

Interestingly, I only recorded the use of vague instructional methods in Advanced Placement and Honors classes. Additionally, the “group” in 5 of the 7 instances where vague instructional methods were used consisted of whole class dialogue and discussion where at least half of the students in the class were actively participating in a discussion. The students were all described as on-task in these instances even though they were not all actively participating in the discussion. The instances in which students were off-task all occurred with specific instruction.

There are three things of note that one can take from this qualitative study. Vague instructional methods produced more collaborative, on-task work than specific instructional methods in this study. I found that in the English classroom, teachers do not do a lot of group work assignments, but the level of progress of the group work seems to be related to the type of instruction and the amount of follow-on guidance given by the teacher. Finally, this study showed that “group work” is most often used by the teacher in discussion, as one big group, editing writing assignments, and reading aloud responses to each other.

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The Effect of Musical Mnemonic Devices on Biology Retention Including Unique Effects for Class Level, Ethnicity, and Gender

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December, 2006

Introduction

A Mnemonic is something intended to assist the memory, as a verse or formula (<http://www.dictionary.com>). Mnemonic devices have been used for years as simple strategies to remember academic concepts. Memorable mnemonics include “Please Excuse My Dear Aunt Sallie” for the order of operations in math as well as the ABC song which is taught as a basic reading skill. Although prevalent in mathematics and reading classes, mnemonics are difficult to find in secondary education biology classes. Also, little is known about how the use of mnemonics could create culturally relevant memorization which would allow minority students to relate to academic content in their own way. Parsons (2000) emphasizes the importance of “culturalizing” science education for minority students. “Culturalizing” science education includes incorporating harmony, movement, communalism, expression, and orality into science classes to increase minority achievement in science. Musical mnemonic devices can be used to encompass all of these aspects. This study investigated the extent to which musical mnemonic devices effected retention of biological concepts and if there were unique implications according to class level, ethnicity, and gender.

Review of Literature

In 2003, Carney and Levin also found that by integrating mnemonics with reasoning and “inter-organism relationships,” students recall more items, and details of each item, such as order, family, and organism species. Students were also found to have higher performance on the recall of the relationships of each organism. They conducted two experiments, the first of which combined fish names from pictures and hierarchical information, and the second experiment the amount of fishes to be memorized were

decreased. It was found that performance on analogy relationships increased through the usage of mnemonics. Carney and Levin (2003) suggest that “mnemonic strategies facilitate students’ learning of higher order information” which coincide with Campabello, DeCarlo, O’Neil, and Vacek (2002).

Campabello, et al. (2002) studied three elementary schools with high minority populations, which were predominantly Hispanic, in three Mid-western suburban schools. A total of six academic songs were taught over a fourteen week period, as memorization strategies, following an introduction by the teacher of a new fact, skill, or concept. Teachers played CD’s, modeled the songs with motions, or moved around the class to observe class participation and connected the song with other concepts. They found that student interest increased and students who were not English proficient were also learning and participating in the musical lessons. Pre and post tests, rubrics and checklists (for tracking learning goals for teachers), journals, anecdotal records, and questionnaires were all used for data collection. Journals were used to document each student’s individual skill improvement. Repetition of the songs was a large component of the students learning the songs in the study. Results found that student’s knowledge of tested skills and content increased with the usage of the academic songs. Campabello, et al. (2002) state the use of music as a mnemonic device “alters and increases brain function for higher order thinking,” such as vocabulary acquisition, symbolic understanding, and sense of sequence. In a long-term study, Campabello, et al. (2002) found that children of preschool age who were exposed to music had IQ scores which were 10-20 points greater than children who had no exposure to music. They also state that by the age of 15, the children with early exposure to music were reported to have higher reading and mathematics scores, memory recall, and emotional involvement especially when desired skills are set to familiar tunes which provide cultural connections for students.

Methods

Participants

The participating students were semi-randomly assigned (some students were assigned and some were randomly placed) to introductory biology classes during the summer of 2006. Classes for the study were chosen through convenience sampling, due to time and access restraints. The chosen classes have students with a diverse range of

abilities. Class A is a regular level full-inclusion class, in which students with learning disabilities (including Attention Deficit Hyperactivity Disorder and Dyslexia), behavioral problems, and low intelligence (Intelligence scores ranging from 70-85) are assimilated into standard learning classes (18 students). Class B is a regular biology class which has the same instruction as an inclusion class but with a smaller range of learning diversity (20 students). Class C is an honors biology class in which students are taught at an accelerated pace (20 students).

The study included a total of 58 ninth, tenth, and eleventh grade students at a public high school in Central North Carolina. Students were of varying backgrounds, socioeconomic status, and ethnicities. There were a total of 24 male and 34 female participants in the study and the ethnic composition of students is displayed in Figure 2.

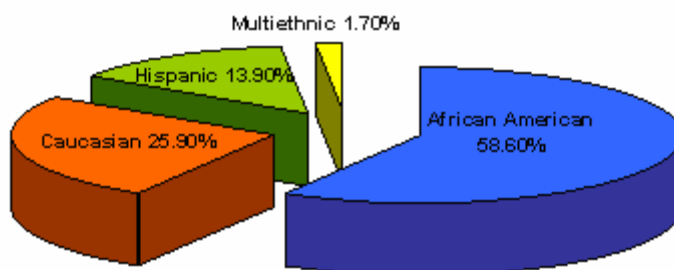


Figure.2 Pie Chart displaying the ethnic make-up of study participants

Study Design

This study was designed with both quantitative and qualitative parts. Participating students took a pre test on biochemistry, specifically organic molecules, in their biology class (Appendix A). They were then taught a song on carbohydrates, lipids, proteins, and nucleic acids (Appendix B). Four days before being introduced to the organic molecules portion of the biochemistry unit, the participating teacher recited the song in class with students 1-2 times daily for 1 week. Retention was examined through a post test following the completion of the biochemistry unit (Appendix A). An open-ended feedback questionnaire was given to students and the classroom teacher after the post test to determine students' self-assessment of their progress through the unit and to determine

how the teacher thought students were progressing (Appendices C and D). An overview of the study is in Figure 1.

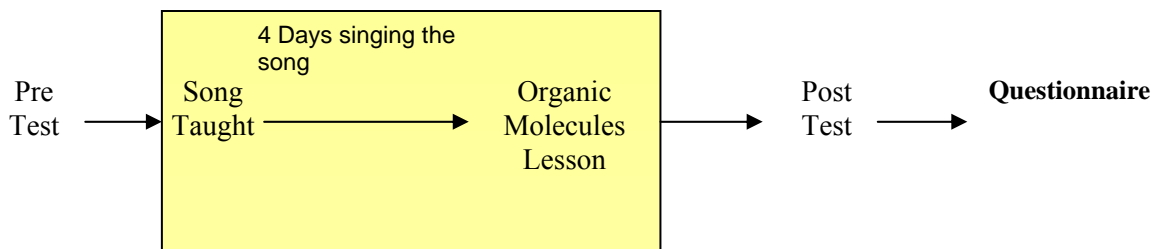


Figure 1. An overview of the study for classes A, B, and C.

The song is entitled “Organic Molecules,” and was written by the principal investigator to the tune of “The Flintstones” theme song by Hoyt Curtin, originally written for Hanna-Barbera Productions Inc. (Appendix B). “Organic molecules” details lipids, carbohydrates, proteins, and nucleic acids by function, basic composition, and where they can be found in nature. It was written to provide students with basic knowledge of these structures which provide the basis of all metabolic processes in most organisms and plants. For example, the first stanza which was repeated in subsequent stanzas is:

But-ter meats and fried stuff
Con -tain fatty lip-ids
Insoluble in water
With a 3 carbon glycerol group.

All provide a relatable example of where the compound molecules can be found. Lipids, for example are found in butter, meats, and “fried stuff” (oils and grease). Also, identifying characteristics are contained in the song; lipids are fatty and also insoluble in water. A key structural characteristic is that lipids have glycerol groups which contain three carbons that are bonded together. Each organic compound has each of the components identified above, similar to lipids.

Analysis & Results

Each class had an increase in scores between pre and post tests (Figure 1). Pre tests were significantly different from post tests with a significance of 0.00 and $\alpha=0.050$. There was a significant correlation (-0.304, $\alpha=0.050$) with the 1st question on the questionnaire, "Is the song easy to remember? Why/ why not?", and class level. The negative significance was due to an inverse relationship between questionnaire, class, and post test coding. Students who used the mnemonic had higher post-test scores (sig. = - .314, $\alpha=0.050$). There was no significant difference or correlation between students of different ethnicities and gender with test scores, song ease, and song use.

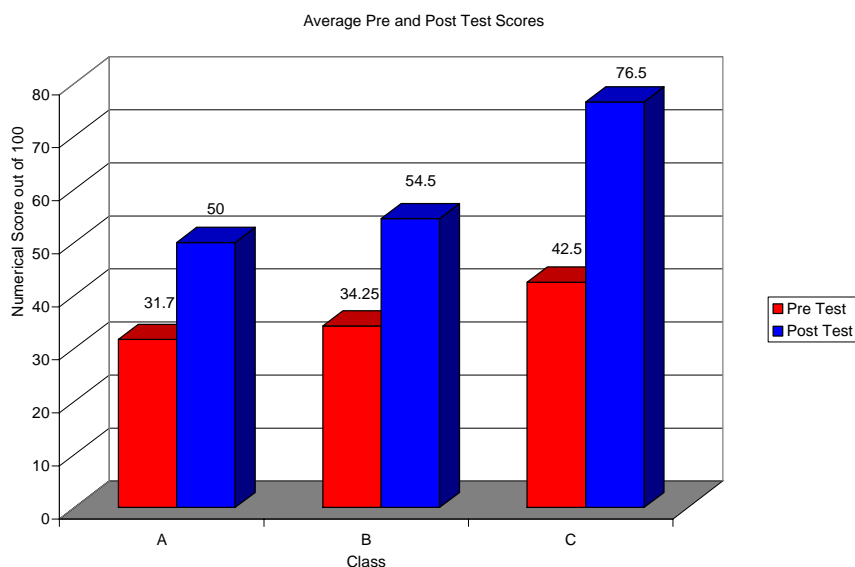


Figure 1. Graphical Difference between pre and post test scores for each class

Discussion

As suggested by the literature, musical mnemonic devices have a positive effect on student retention across class levels. The song helped to reinforce the unit by introducing students to basic biochemistry (organic compound) terminology and characteristics. Thus, when the lesson began, students were already familiar with the content. It was found that honors students were more likely to think the song was easier because they were more apt to learn the vocabulary and were the only group who reported already knowing the vocabulary. Although some students had difficulties, one student stated that "I couldn't get the words into my head and the words were big, but this was just when we first started on it, but now it's a little easier."

Students reported that they “hum it (the song) in the cafeteria,” in other classes, and a few even mention singing the song to younger siblings. “Yes, one time I was singing the part where it says ‘amino, amino acids’ because I was telling my sister that in biology class we were singing a song. I was singing it in a funny way to make my sister laugh.” Although this student was singing the song to entertain a sister, they were subconsciously studying and, whether due to the song or not, had a 50% point increase between both of their tests.

The lack of significant differences between ethnicities and gender can be attributed to small participant count and limited time. Therefore this study cannot be generalized due to the limitations as mentioned above. Although these limitations were significant, the amount of knowledge gained from how to use musical mnemonic devices for future research was valuable. Future research such as the effect of student-made musical mnemonic devices on retention which would allow students to integrate biology into songs which are culturally relevant to their lives Through building a base through using musical mnemonic devices, students can facilitate their own learning in a way which is culturally relevant..

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The Effects of General and Explicit Lab Instructions on Student Time Off-Task

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Introduction

Labs are an important part of any high school chemistry class, but due to time constraints, they are often difficult to schedule. When teachers do manage to work in labs, students spend a lot of time off-task during the labs and feel this is justified (Haslam and Gunstone, 1996). In a study of student behavior and achievement Hecht (1978) determined that there is a high correlation between student time on-task and student achievement. If teachers could do something as simple as giving students a different type of lab instruction and that would increase the amount of time that students spend on-task during lab, then students could accomplish more during scheduled labs.

This study attempted to determine if students were more off-task during lab when they were given general or explicit instructions. The students completed two labs and did one lab with general directions and one with explicit. The labs were video taped and analyzed to determine the number of students off-task every 30 seconds. The number was also divided into the number of males and females off-task. This was done to determine if the general and explicit instructions had different effects on students of different genders. Nine students were interviewed about the labs, the type of instructions they would prefer and why.

Review of Related Literature

In a study of observation in science classes and students beliefs about the nature and purpose of observation Haslam and Gunstone interviewed students in and out of lab, made observations of laboratory classes, and gave questionnaires to student teachers. That students: thought observations were important when the experiment was interesting, paid attention to the steps or parts of the experiment that the teacher mentioned or

focused on, and that students spend a great deal of time off-task during lab and feel justified in doing so, especially when working in groups. Students felt that lab time was an appropriate time to catch up on other work, then they could copy data recorded by other members of the group.

While previous research had been done on teacher management and student behavior during group instruction, Tobin (1984) focused on teaching behaviors and student task involvement in activity oriented science. Student engagement was coded and teaching behavior was rated on a scale of one to five for twenty-five different variables. The task that the students were allocated to do at any given time was also recorded. Tobin (1984) found that students were most engaged when they were collecting, which involved collecting data, recording data, or copying material from books or the chalkboard. Students were most off-task during planning portions of the class. Overall students were on-task two-thirds of the time observed.

Therefore, this study will investigate the following null hypotheses:

1. There is no difference in the percentage of time spent on-task between students who receive explicit step-by-step instructions for a lab and students who receive general instructions for the same lab.
2. There is no difference in the percentage of time spent on-task between males who receive explicit step-by-step instructions for a lab and students who receive general instructions for the same lab.
3. There is no difference in the percentage of time spent on-task between females who receive explicit step-by-step instructions for a lab and students who receive general instructions for the same lab.

Four chemistry classes were selected using convenience sampling. The students were randomly assigned to the classes by the guidance counselors at their school. All students participated in two labs. Each class was randomly assigned to the type of lab instructions that they were given for the first lab and then were given the other type of instructions for the second lab (Table 1).

Table 1. Experimental Design

Classes	Density Lab	Electron Configuration Lab	Interviews
A and B	General Instructions	Explicit Instructions	Randomly Selected Students
C and D	Explicit Instructions	General Instructions	

Students worked in groups of three or four on both of the labs. The groups were assigned by the teacher and each lab was completed in one forty-five minute class period. After instructions were given, students had forty minutes to complete each lab. The study took two regular class periods for each class chosen to participate. All classes received the same instruction leading up to the labs and had the same prior experiences in lab with the regular classroom teacher. The total number of students present for each lab was recorded as was the type of treatment that each class received.

Each lab was video taped from the back of the classroom using a wide angled lens. Students were not identified, but were observed during each lab. Students who did not return the parental consent or student assent forms, or returned them without permission to be videotaped and interviewed were placed at a desk in one part of the room and the camera was set up so that these students were not taped. The tapes were watched repeatedly and the number of male and female students off-task every minute was recorded in an observation chart. A student was determined to be on-task if they were actively participating in anything that specifically related to the lab. Examples of on-task behavior exhibited during the lab are obtaining materials, mixing solutions, and using a balance. A student was determined to be off-task if they were not actively participating in the lab. Examples of off-task behavior exhibited during the lab are texting on a cell phone, brushing hair, and talking about weekend plans with members of other lab groups. The tapes were also analyzed to determine if there was a pattern of on or off-task behavior exhibited by students.

Students were randomly selected to be interviewed and were first shown both the general and explicit versions of the density lab and the differences between the versions were noted. The first question was “Given the choice between these two versions of the same lab which one would you choose to do and why?” This question was asked just to

have the students look at both versions of the lab and to determine which version the students preferred and why. The second question asked was “Which of the two versions would keep you more on-task or focused on the lab and why?” This question was asked to determine which version students thought they would be more on-task when using. The same questions were asked of the students after they were shown both versions of the electron configuration lab. Notes were taken during the interview and five minutes after each interview was taken by the interviewer to finish recording information and answers obtained during the interviews.

Results

The average number of students off-task every thirty seconds is shown in Figure 1 below. The average number of students, males, and females off-task during the labs in which they had explicit instructions was lower than the average number of students,

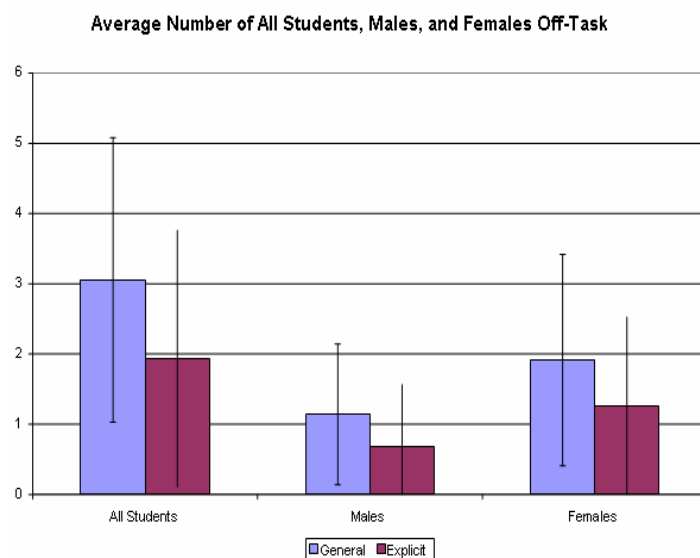


Figure 1. Graph of the average number of students, males, and females off-task with y-error bars equal to ± 1 standard deviation

males, and females off-task during the labs in which the students were given general instructions. The error bars which represent \pm one standard deviation show that there was a wide range in the number of students, males, and females off-task during any given thirty second interval.

To determine if the effects of general and explicit lab instruction on student time on-task were significantly different a t-test for independently sampled instances was

performed with the type of instruction, general (G) or explicit (E) as the independent variable and the number of students off-task as the dependent variable. The significance was 0.0 and using a comparison of the means it was determined that the number of students off-task with general instructions was significantly higher than the number of students off-task with explicit instructions ($\alpha = 0.05$).

Two more t-tests for independently sampled instances were also performed using the type of instruction (G or E) as the independent variable. The first with number of males off-task as the dependent variable, and the second with the number of females off-task as the dependent variable. Both have significance values equal to 0.0 and by comparing the means it was determined that the number of males and the number of females off-task with general instructions are significantly higher than the number of male and the number of females off-task with explicit instructions ($\alpha = 0.05$).

During the labs it was observed that students with explicit directions were much more organized with their lab equipment and procedure than students with general directions. Students with explicit directions also asked the teacher many more procedural questions than the students with general directions. Finally students with the explicit directions were observed to have skipped straight to the data chart provided for them when they were trying to figure out how to do the lab rather than reading the directions.

Nine students were interviewed nine days after the second lab. Each student was handed copies of the general and explicit version of the density lab and asked to note the similarities and differences between the labs. After this each student was asked which version he or she would choose to complete given the choice then asked why. All nine students chose the explicit version of the lab. Their reasons all centered around the idea that they would have to work as hard, it looked easier to follow, and the chart would help them stay organized. One student said specifically that the explicit version “looked easier because it told you exactly what to do and you didn’t have to think about what you were doing while you were doing the lab.” When asked, all nine students also said that they thought the explicit version would keep them more focused on the lab.

The same procedure was then followed for the electron configuration lab. All but one of the nine students interviewed also chose the explicit version for this lab. Many of them focused on the chart given with the explicit version when attempting to explain why

they chose the explicit version. Many said that the chart would help or had helped, depending on which version of the lab they completed, them to organize their thoughts. They also said the chart would help them stay more focused on what they were supposed to be doing. The one student who chose the general version of the lab said it had less pages so it would probably be easier overall and easier to focus on.

Discussion

Students are significantly more off-task when given general instructions during laboratory activities than they are when they are given explicit instructions. The off-task behavior of students when given general instructions may be related to a study by Tobin (1984) where it was found that students were most off-task during the planning portions of a class. Tobin also found that students were most engaged and the less off-task when they were involved in collecting data or recording data. Students were given general instructions were required to create their own procedure for their lab activity. This is a planning activity and a portion of the lab where students were very off-task. Students with general instructions were not given a data chart by the teacher, they were required to plan and fill in their own chart. This is also a planning activity and this one made it more difficult for students to collect and record data, which was an activity that would have kept them more on-task according to Tobin (1984). Students given explicit instructions did not have to plan their own activity; students were only required to follow the instructions that they were given. These instructions along with the data chart that was provided by the teacher allowed students to immediately start collecting and recording data, which have been shown to be lower off-task behavior activities by Tobin (1984). It was also found that both males and females were significantly more off-task when they were given general instructions instead of explicit instructions. These results would signify that the gender of the student does not affect the off-task behavior of the student in lab when given general or explicit instructions.

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