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Leah P. McCoy, Editor

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Mathematical Reasoning in Multiple Representations: Connections and Confidence

Justin Allman

With Leah P. McCoy, Ed.D.

Wake Forest University
Department of Education
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Introduction:

Fuson, Kalchman, and Bransford (2005) outline three common misconceptions about mathematics which are a result of traditional instructional techniques. First, "mathematics is about learning to compute." (p. 220) This erroneous belief does not encourage students to synthesize and abstract procedural knowledge and find meaning. Next, "mathematics is about 'following rules' to guarantee correct answers." (p. 220) This second, flawed perspective clouds even the origins of math. Students have no reason to consider other cultural influences on the development of mathematics, they must simply follow rules. However, in contrast, math is an ever expanding field—more a method of communication than an arena for procedural directions. Finally, traditional methods of teaching math often enforce the notion that "some people have the ability to 'do math' and some don't." (p. 221) America's classrooms must address these three dangerous preconceptions in order to empower all students with the opportunities to succeed in mathematics.

Review of Literature

Math makes sense? In the United States, math is not typically taught by emphasizing connections. In fact, compared to other technologically advanced countries such as Japan, the United States does not place nearly as much importance on connections. A 1999 report, *The Third International Mathematics and Science Study* (TIMSS), compares instructional practices in seven countries. The report found that students spend 54% of class time making connections in Japanese math classes compared to just 17% in American classrooms (Hiebert, et al., 2003). In addition, Fernandez and Cannon (2005) report that teachers in Japan and in the United States adhere to different values when preparing lessons. American teachers tended to value correct procedure over logical reasoning or deep thought, and willingness to continue learning new procedures

(motivation) over enjoyment. Of course, these preferences themselves could explain the unpleasant attitudes that accompany the word "math" for many Americans.

For elementary school mathematics, the National Research Council (2001) gives five "intertwining strands" for mathematical proficiency. Fuson, Kalchman, and Bransford (2005) give concise definitions for each strand.

1. *Conceptual understanding*—comprehension of mathematical concepts, operations, and relations
2. *Procedural fluency*—skill in carrying out procedures flexibly, accurately, efficiently, and appropriately
3. *Strategic competence*—ability to formulate, represent, and solve mathematical problems
4. *Adaptive reasoning*—capacity for logical thought, reflection [metacognition], explanation, and justification
5. *Productive disposition*—habitual inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one's own efficacy (p. 218)

Secondary Mathematics. The National Research Council's (2001) "intertwined strands," were presented for elementary school mathematics, but are equally, if not more important in secondary school. After all, students in secondary mathematics classes are asked, more than ever before to make connections between the concrete and abstract, solve difficult problems, and make sense of real world situations using mathematics. The National Council for Teachers of Mathematics [NCTM], in *Principles and Standards for Teaching Mathematics* (2000), outlines several standards which should be prevalent in all secondary math classes. Particularly, *problem solving, reasoning and proof, communication, connections,* and *representation* map nearly exactly to the process of completing a proof and then applying the proved theorem to solve problems and make sense of real world situations.

Methodology

The subjects of this research were students in a Geometry class at a magnet school in Winston-Salem, North Carolina. The researcher observed several class meetings, paying special attention to the students' mathematical communication skills. Based on these observations and recommendations from the teacher, 10 students were selected to participate in the study. Pseudonyms were used in this paper to describe individuals. Each subject was interviewed individually and videotaped in a 15-25 minute session.

First, each student was asked to prove that if two angles of one triangle are congruent to two angles of a second triangle, that the triangles are similar. The hope was that the students would recognize that because all triangles have an angle sum equal to 180° (we will call this fact the Triangle Sum Theorem [TST]), that the third angles of each triangle must also be congruent, and therefore the two triangles must be similar. The tasks presented to the students are given in the Item 1. Next, students were asked to solve a word problem dealing with a

Participant tasks

Part A

Let ABC and DEF be triangles. Show that if $\angle A \cong \angle D$, and $\angle B \cong \angle E$, that triangle ABC is similar to triangle DEF.

Part B

Suppose the 8-ball is placed on a billiards table so that the 8-ball, a corner pocket, and a side pocket form an equilateral triangle. A chalk line is drawn from the 8-ball to the side pocket and the cue-ball is placed on that chalk line. The cue-ball is then struck in such a manner that it bounces off the wall between the side and corner pockets and strikes the 8-ball directly. A residue of chalk is left on the wall where the cue-ball struck it. Later, it is observed that if another line is drawn from the 8-ball's position to the chalk residue on the wall (tracing the path of the cue-ball) that the line forms an angle of 71° with the wall.
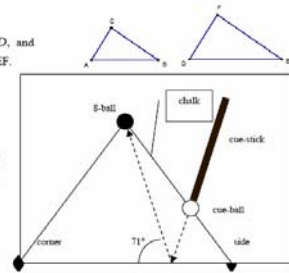
Assuming the incoming angle is equal to the outgoing angle that the cue-ball makes with the wall, and the ball was hit straight (with no spin or "english"), what angle did the cue-stick make with the first chalk line just as it struck the cue-ball?

Part C

Use the patty paper to test whether or not the theorem in part A is true.

1) Use a ruler and a pencil to draw a scalene triangle on a piece of patty paper. Label the angles A, B, and C.
2) On a separate sheet of patty paper, trace angle A and label it. On another sheet of patty paper, trace angle B and label it.
3) On a new sheet of patty paper, use these angles and a ruler to draw a new triangle, smaller than that first. Label the angles.
4) Place the new triangle on top of the old one with angle C at the top.

Do the two shared angles ensure that the two triangles are similar?

Item 1. Participant tasks

billiards table in which they would also need to make use of the TST. Students were not expressly told, however, that they should use a similar idea to complete both tasks. Finally, students were asked to use hamburger patty paper to construct an example model. The researcher reviewed the videotapes of each session to interpret and analyze subjects' thinking according to the five "intertwined strands" and the extent to which they made use of problem solving techniques to demonstrate the NCTM standards.

Results & Conclusions

Conceptual understanding vs. procedural fluency. Most students relied solely on their ability to reproduce procedure. For example, three students immediately made a statement/reason chart (beginning of a two-column proof) once they recognized that Part A required a proof. However, these students, even after correctly answering the question "What do the angles in a triangle add up to?" could not finish the proof immediately. One student, Hillary, replied "They all have to be 180 . . . but we don't know what they are." She was saying that the TST was useless in solving this problem because she could not assign a number to the measures of given congruent angles. In fact, only three of the 10 students, Anna, Mary and Robert were able to finish the first task without hints or help from the researcher. They concentrated first on the conceptual ideas that would help them justify their claims. Robert explained his conjecture that the third angles must be

congruent by citing ". . . they all have to add up to 180 . . . so if these are both 30 [referring to the first set of congruent angles] and these are both 50 [referring to the second set of congruent angles], . . . then these both [referring to the remaining angles] have to be 100." In other words, the exact measurements of the congruent angles should not matter, because when subtracted from 180, they would give the same result.

Strategic competence. Casandra, one of the students who immediately made a statement/reason chart for Part A, complained that ". . . if I had two parallel lines, then I could do it." Four other students shared this approach. Apparently, the only procedure they knew to solve questions about angle measures dealt with properties of parallel lines cut by transversals. In contrast, as Mary thought out loud about the most efficient way to solve the word problem, she tried a variety of ideas. One of these methods involved the use of parallel lines, but she quickly dismissed the scheme, citing, "No, all these lines intersect so that won't work." Mary, unlike the majority of her classmates, used her metacognitive dexterity to evaluate the most reasonable approach to solving the problem.

Adaptive reasoning. While constructing the triangles on patty paper in the third part of the interview, only two students, Daniel and Mary drew all their lines with a ruler. However, the architectural shortcomings of the other students led to interesting responses when asked if the third angles should have been congruent. All but one of the students believed that the third angles should have been congruent, but gave different reasons. Lindsay, Daniel, and Casandra all cited a theorem they had memorized from class: the so-called Third Angle Theorem [TAT] stating that if two angles of one triangle were congruent to two angles of a second triangle, that the third angles of each triangle must be congruent. Of course, this "theorem" is a direct consequence of the TST. However, only Anna, Julie, and Robert used a reference to Part A to justify their claim that the third angles should be congruent. These last three also remembered the TAT from class, but could explain its dependent relationship with their proof in Part A.

Productive disposition. A few students seemed to exude confidence in their mathematical ability—most notably, Robert, Anna, Mary and Zach. For example, upon completion of the final task, both Robert and Mary placed their pencil down on the table and leaned back in their chairs as if to say, "Check me out. I'm done!" Other students

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lingered awkwardly at the table until I told them they could leave. Most importantly, Robert, Anna, Mary, and Zach struggled less with allowing procedure to bog them down.

Concrete procedure vs. abstract concepts. Similar to previous research, these results seem to imply that procedural fluency cannot breed conceptual understanding, but rather a rooted conceptual framework will lead to fluency in carrying out procedures. As part of the *Representations* Standard, NCTM (2000) asserts that representations are useful because they allow students ". . . to see a common structure in mathematical phenomena . . ." (p. 68). Even those students who were not otherwise able to make the connection between the TAT from class and the proof in part A were able to give reasonable explanations for why their constructions should have resulted in congruent third angles. Perhaps multiple representation holds the key to unlocking students' abilities to make connections, and therefore to construct conceptual frameworks.

Implications for instruction. If deep conceptual understanding leads to increased procedural fluency and confidence, teachers should conduct their classrooms with the expressed goal of nurturing concepts. Perhaps the best way to develop a deeply-rooted conceptual backbone is to present and allow students to investigate with multiple representations of the content. A variety of representations will aid students in connecting various mathematical ideas and building upon previous ideas to construct an intertwined web of understanding. Students can then make use of conceptual frameworks to discover efficient procedures for themselves.

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The Effects of Problem-Based Learning on Student Engagement and Motivation

Joshua Bragg

With Robert Evans, Ph.D.

Wake Forest University
Department of Education
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Introduction

Student motivation and engagement are of prime importance to academic success. Problem-based learning (PBL) has been used extensively in the medical schools with a stated goal of increasing student intrinsic motivation (Barrows, 1983). While problem-based learning is currently being used in some K-12 schools, only a limited number of studies have been done to validate the claim of increased motivation for this age group (Hmelo-Silver, 2004). This study will seek to address this need and determine if problem-based learning does increase student engagement and motivation.

Review of Literature

Problem-based learning (PBL) curricula focus on relevant ill-structured problems which are presented to students to be solved (Barrows, 1983; Hmelo-Silver, 2004). Students must work collaboratively in groups to appropriately analyze the problem and formulate possible solutions. PBL has been theorized to increase intrinsic motivation for a variety of reasons (Norman & Schmidt, 1992; Pedersen, 2003; Hmelo-Silver, 2004). The presence of an engaging problem that is meaningful and of value to students is of prime importance in PBL. The chance for students to learn and apply knowledge to a concrete problem is thought to greatly enhance motivation. In addition, it is thought that perceived student control of the learning process also enhances student motivation.

Brophy, Rohrkemper, Rashid, and Goldberger (1983) provide a simple working definition for motivation towards tasks as "whether or not [students] want to engage in such tasks in the first place (p. 545)." Brophy *et al* (1983) continue to further utilize engagement as a proxy for motivation by considering students' time on-task during various lessons. Rather than assessing motivation through attitudinal means, this study will examine motivation through the more directly useful classroom measurement of student time on-task.

Methodology

Six Biology classes (4 Honors, 2 Regular, 150 students total) taught by two experienced teachers participated in this study. Two Honors and one Regular class were randomly assigned to each single day treatment lessons, PBL or Traditional. The PBL lesson was based on the carnivorous behavior of *Photuris* fireflies and was designed to teach several animal behavior concepts. The Traditional lesson was designed to teach the same animal behavior concepts using simulation activities and a short scenario worksheet. Both teachers are experienced using PBL methods, although one had not used PBL with the current students. Students worked in groups of four throughout both lessons.

The problem for the PBL lesson was presented using a PowerPoint presentation to standardize the presentation of the problem. Students were then asked to work in groups to identify what information they knew, what they needed to know, and a hypothesis for the behavior. The student groups then designed possible experiments to test their hypotheses and presented the experiments to the class. The lesson was concluded with a brief teacher summary of the mechanism involved.

The Traditional lesson was composed of two activity rotations. The first rotation included a simulation of the effects of camouflage in a predator-prey relationship. The second station asked students to analyze scenarios on a worksheet to describe particular animal behaviors. The second station also included a trial and error learning simulation using a maze.

During the portions of each lesson when students were working in groups, the class was observed to quantify student time on-task. Students were observed at two minute intervals and classified as on-task, off-task, or having completed work. Students were further disaggregated by gender. If it was not readily apparent what category in which to place students, the researcher further observed that student in order to make an accurate determination. That determination never overlapped with the next scheduled observation interval. The number of times students were observed encouraging others to return to on-task behavior was also recorded. Six students were interviewed to further probe any engagement and motivational enhancements, two immediately following the lesson, while the other 4 were interviewed two weeks later.

Results and Conclusions

Comparing the frequencies of off-task behavior between all Traditional and PBL classes, students in PBL classes were found to be significantly more off-task than students in Traditional classes ($\chi^2 = 27.8$, p < 0.001). Upon further examination, a high degree of variance was noted in the percentages of off-task behavior observed in PBL classes. The data is summarized in Table 1 and Figure 1.

Table 1: Comparison of off-task behavior

	Teacher	Class Type	Class Level	Off-task Percentage
Class 1	A	Traditional	Honors	3.97%
Class 4	B	Traditional	Regular	5.47%
Class 6	A	Traditional	Honors	7.64%
Class 2	B	PBL	Honors	0.00%
Class 3	B	PBL	Regular	6.61%
Class 5	A	PBL	Honors	23.80%

The variation in student engagement in the PBL classes is unevenly distributed with mean percentage higher than the median percentage for off-task behavior. With such variation likely to obscure any
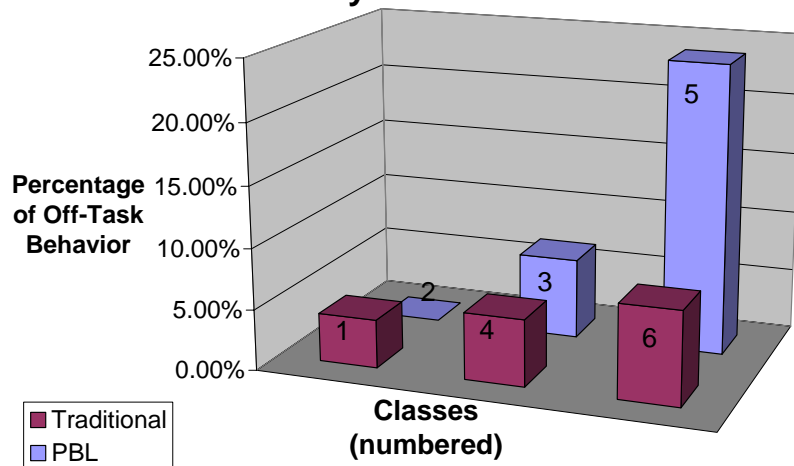
Figure 1: A graphical comparison of the amount of off-task behavior for each class

effects of the PBL treatment, a more controlled comparison was sought. Classes 3 and 4 were selected for this comparison because they were taught by Teacher B and were both Regular classes. No significant difference was found for those classes ($\chi^2 = 0.372$, p > 0.05).

Interview data slightly mirrored the variation in off-task behavior. Students in PBL classes gave more varied reasons in responses to questions. There were no apparent differences or patterns in student encouragement of others to return to on-task behavior.

Initial comparisons across all classes showed significantly lower engagement for males in PBL classes ($\chi^2 = 7.76$, p < 0.01) and significantly lower engagement for females in PBL classes ($\chi^2 = 24.5$, p < 0.001). Again, a more controlled comparison using Class 3 and Class 4 was attempted to address the uneven variance of the PBL classes. Using only those classes, there was no significant difference between PBL and Traditional classes for males ($\chi^2 = 8.32 \times 10^{-7}$, p > 0.05) or females ($\chi^2 = 1.07$, p > 0.05).

The uneven variance in student time on-task in PBL classes obscures the possible effects of the PBL treatment. The most controlled comparisons possible with the available data suggest there is no difference between Traditional and PBL classes in student engagement and motivation. This is further supported by the similarity of the interview data and results from gender comparisons. However, this finding is at odds with the available literature on PBL for both K-12 settings as well as medical schools (Barrows, 1983; Norman and Schmidt, 1992; Pedersen, 2003; Hmelo-Silver, 2004). It is likely that the reduced sample size in the controlled comparisons also interfere with any statistical differences. More voluminous data is clearly needed here to further analyze this issue and perhaps eliminate the uneven variance.

The variance in student engagement in PBL classes is a previously unreported phenomenon. With only three classes each treatment group, more research would clearly add to this area to determine the nature of the variance. The variance may be the result of the student's previous experience with PBL. Students in Classes 2 and 3 had not previously been exposed to PBL methods by Teacher B. However, Class 5, the class with 23.80% of behavior observed classified as off-task, has been taught previously with PBL methods by Teacher A. The novelty of the PBL experience for Classes 2 and 3 might have mitigated any off-task behavior that would have resulted from the PBL experience. However, this is unlikely, with all literature suggesting that PBL increases student engagement and motivation.

Unfortunately, due to the design of the study, few reference points exist to compare classes to account for any variations. Since PBL is a strongly student centered environment, small student attitudinal differences could be amplified by the lessons they experience. In addition, it is possible that Class 5 is simply more predisposed for students to be off-task as a function of the unique group dynamics. An "own-control"

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design for future studies would allow researchers to compare on-task behavior in a treatment lesson to some baseline level of on-task behavior from normal classroom activities. This design would allow more accurate between class comparisons and comparisons between methods.

Further research is needed to asses the variance found in the on-task behavior of students in PBL classes. While the variance does obstruct definitive conclusions, controlled comparisons suggest no difference in student engagement and motivation in PBL classrooms. This finding does not support PBL's goal of increasing student motivation in the context of high school biology classes.

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Creative Thinking Questioning in the Secondary Social Studies Classroom

Eric M. Cain

With Raymond C. Jones, Ph.D.

Wake Forest University
Department of Education
December, 2005

Introduction

The classroom is more than a place for knowledge acquisition; it is also a space for constant thought and reflection. Critical thinking has been incorporated into contemporary classrooms, especially in the social studies, with good reason. Social studies is not all about facts; it is about understanding those factual pieces of information and how they apply to our lives and our common experiences. Creative thinking, the researcher contends, has an equally important role in the educational experience of students. Not only does creative thinking involve original thinking and risk-taking in some way, it also attempts to help students see a variety of issues, concepts, and ideas from different perspectives. An environment that fosters creative thinking inevitably seeks to have students think on their own. This study explored how often creative thinking is used in the classroom and to what depth creative thinking questioning reaches.

Literature Review

Understanding creative thinking means understanding some of the psychological factors in creative thinking research. For example, a high level of creative thinking does not necessarily translate into a higher or lower level of analytical thinking (Sternberg, 2003) or intelligence (Carroll & Howieson, 1992), or vice versa. Additionally, a study by Yang and Lin (2004) observed no significant correlation between components of creative thinking and critical thinking among students. It is, however, important for educators to note that creative thinking and critical thinking are not totally mutually exclusive, as there is literature that notes quite the contrary (Bleedorn, 2003; Carson & Bittner, 1993; Cliff & Miller, 1997; Halpern, 2003).

Creative thinking and its impact on student interest and performance in and out of the classroom has also been well-researched (Ataya & Kulikowich, 2002; George, Mitofsky, & Peter, 2001; Milgram & Hong, 1993; Sternberg, 2003). Milgram and Hong

(1993) even noted that students who demonstrated higher levels of creative thinking and creative performance had a higher level of accomplishment later in life than that of students with higher grades and higher levels of intelligence. Furthermore, emphasizing creative thinking among youth has been encouraged because of the potential supplemental benefits to students in regard to overcoming difficult situations in life (Carson & Bittner, 1993). This information can be helpful in better understanding the long-term implications of fostering creative thinking in the classroom, beyond immediate, tangible results (i.e., grades or test results) during the school years.

  In order to help students become better thinkers, creative thinking can be fostered in the classroom (Caroll & Howieson, 1992; Carson & Bittner, 1993; Cliff & Miller, 1997; La Greca, 1980; Sternberg, 2003; Wheeler, Waite, & Broomfield, 2002). Though implementing creative thinking in the classroom may be a challenge, those skills involved in creative thinking are teachable (Sternberg, 2003). Small measures such as appropriately implementing incubation or simple wait time in the classroom can also prove effective in fostering deeper thought of any kind (Cliff & Miller, 1997; Harrop & Swinson, 2003; Wheeler, Waite, & Bromfield, 2002). Creative thought, after all, takes time. If educators are better aware of the importance of fostering creative thinking and the research behind it, they can produce an environment conducive to creative, productive student learning. A more practical lesson from the creativity research is that educators should be aware of the questions and prompts they are posing to their students. Differentiation of curriculum and questions is a strategy that can be helpful even beyond that of creative thinking questions (Mosley, 2003; Harrop & Swinson, 2003).

Methodology

  The present research project was a qualitative study based on non-participant observations in secondary social studies classrooms. Three high school social studies teachers from a public school system in the Piedmont area of North Carolina were the subjects of the present study. Each of the three teachers taught at least one regular-level social studies course and one advanced-level social studies. The participants taught at different schools, providing some diversity in school demographics.

  After the participants were identified, the researcher observed four class sessions of one regular-level course and four class sessions of one advanced-level course for each

of the participants in the present study over a five week period. The researcher recorded the questions initiated by the teacher and coded them. The questions posed by the teacher during the observed class sessions included content-related questions or prompts during discussions/lectures, tests/quizzes, worksheets/handouts, and projects/activities that the teacher implemented and/or designed. Content-related questions, for purposes of this study, included questions directly related to the social studies curriculum and/or relevant questions used by the teacher to initiate or make a transition to content material. The coding was based on the eight components of creative thinking skills based on a cognitive-affective design for creative thinking designed and elaborated by Williams (1986). Those components in Williams's cognitive-intellective domain include fluent thinking, flexible thinking, original thinking, and elaborative thinking; those in the affective-temperament domain include risk-taking, complexity, curiosity, and imagination (Williams, 1986). Additionally, the questions were all classified based on Bloom's (1956) Taxonomy of Educational Objectives to better identify the types of questions posed (i.e., levels of critical thinking) in each of the class sessions.

Results & Conclusions

The data collected and analyzed for this study showed that creative thinking questions are not being used in the secondary social studies classroom. Of the 912 questions posed by teachers to students during the observation period, only one creative thinking question emerged. That one creative thinking question was a basic flexibility question, focusing on alternative ideas, falling in the cognitive domain of the Williams (1986) Cognitive-Affective Interactive Model. The teacher who posed the single creative thinking question was also the teacher who posed the least number of total questions with a total of 72 questions during seven periods of observation. (It is important to note that the other two teachers in the study were observed for eight total periods, while an eighth observation of this particular teacher was not possible for the data collection period.)

The large total of questions may help explain the number of questions seeking short responses without much elaboration. In a research study of questioning and discussion, Klein (2003) noted more extended responses to questions, but also drew attention to the correlation between lower-level critical thinking questions and shorter responses by students. Simply put, questions that require more thought take more

response time. In a separate research study, Harrop & Swinson (2003) noted the use of "closed" questions in the classroom, which are those questions that anticipate a specific response. Creative thinking cannot be engaged in the classroom if closed questions abound.

The data showed that an overwhelming number of the questions (891 of 912) remained at the lower level of Bloom's (1956) Taxonomy. Higher levels of critical thinking are imperative to foster creative thinking questioning in the classroom, as students need to analyze, synthesize, and evaluate in order to effectively address creative thinking questions across both the cognitive and affective domains. The anemic number of questions falling in the middle and higher levels of critical thinking can possibly, in part, explain the lack of creative thinking questioning in the secondary social studies classrooms observed. The teacher posing the single creative thinking question asked the smallest quantity of questions. Nearly one-fifth of the questions in this class (19.35 %) were in the upper half of Bloom's (1956) Taxonomy. This information lends credibility to the argument that less quantity and more quality is better when it comes to questioning.

Students need a knowledge and comprehension foundation to be able to engage in creative thinking and higher-level critical thinking. Sternberg (2003) says that creative thinking skills are teachable, so teachers should not ignore creative thinking based simply on the level of students. Though the total number of questions asked in the present study was relatively the same in regular and advanced classes, the critical thinking quality varied: all eight of the higher-level critical thinking questions and eight of the thirteen middle-level questions were posed in advanced-level classes. This general finding that more higher-level critical thinking questions were posed to advanced-level students was similar to the results of Mosley (2003). The one creative thinking question in the present study also surfaced in an advanced-level class. Teachers should not limit creative thinking to advanced students; students of all academic levels should have creative thinking fostered, as creative thinking can provide life-long benefits for students (Carson & Bittner, 1993; Milgram & Hong, 1993).

Future research on creative thinking questioning should consider student responses in addition to the questions. Student response is the point of questions in the classroom, thus responses would provide additional insight into creative thinking

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questioning techniques and outcomes. Moreover, observations should be completed over a longer period of time with more continuity and coordination between the regular and advanced-level classes of each participant. A greater number and range of participants in future studies would also be helpful to better understand the role of creative thinking questioning across various demographics.

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Suppositional Language in the Secondary English Classroom

Lauren Casey

With Joseph Milner, Ph.D.

Wake Forest University
Department of Education
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Introduction

A teacher's language conveys his/her philosophy about the nature of knowledge, the roles of the student and teacher in the process of learning, and ultimately determines the classroom climate or culture. Speech acts also serve as strong indicators of a teacher's pedagogical style. Bruner (1986) identifies the suppositional style as employing the language of uncertainty, conjecture, and exploration where the teacher is not the authority or keeper of knowledge but instead acts as a guide for investigating and risk-taking students. As teachers consider their language usage in the classroom it is important to determine if this pedagogical style pushes students beyond mere memorization and recitation towards independent, original and analytical verbal responses. The questions this study seeks to answer are: (1) *How prevalent is suppositional language use in secondary English classrooms?* (2) *Does the prevalence of the suppositional style correlate to higher instances of student contributions that display original, hypothetical and critical thought?*

Review of Literature

"Every sentence that we say in real life has some kind of subtext, a thought hidden behind it," (Vygotsky, 1986, p. 250). With this premise in mind educational researchers have sought to understand the significance of language in the classroom. Jerome Bruner (1986) proposes that "the medium of exchange in which education is conducted –language – can never be neutral…it imposes a point of view not only about the world to which it refers but toward the use of mind in respect of this world" (p. 121). Teachers not only communicate content but also how students ought to approach and engage that content. "…if the teacher wishes to close down the process of wondering by flat declarations of fixed factuality, he or she can do so. The teacher can also open wide a topic of locution to speculation and negotiation," (Bruner, 1986, p.127). The kind of

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pedagogical style Bruner imagines, Milner (1991) identifies as *suppositional*, indicated by a kind of developmental conversation between students and teachers that allows for hypotheses and conjecture. Active student engagement in the learning process builds a strong foundation of knowledge but requires that students be allowed to make and correct their own mistakes or illogical conclusions (Fulk, 2000). The suppositional style requires that students be given opportunities for expression and research has shown that, "Given tasks worth talking about and the right to talk, children's interactions can contribute substantially to intellectual development in general and literacy growth in particular," (Dyson, 1987, p. 396-7). Yet the suppositional style also requires that teachers use the language of uncertainty to frame both their own knowledge and the content presented. However, the language of self-disclosure (Bowers & Flinders, 1990) has two possible repercussions: reciprocation by students of equally authentic and original thoughts or confusion due to the perceived inversion of the teacher-student power relationship. A study by Feldman and Wertsch (1976) concluded that a number of factors may inhibit the use of the "uncertainty markers" (p. 239) in the classroom: an assumed differential of knowledge between teacher and student, expectations from both the students and the teacher of the authoritarian role of a classroom teacher, or a desire for social distancing between teachers and students. The benefits of a suppositional pedagogical style seem evident in the higher-order thinking skills it encourages yet further research is necessary to determine if suppositional language actually engenders riskier, more hypothetical responses from high school students.

Methodology

Subjects

The subjects of this study are four teachers and their students in a secondary school in Forsyth County, North Carolina. To preserve anonymity the teachers are referred to as Teacher A, Teacher B, Teacher C, and Teacher D. The students are in sixteen different classes of varying grade, age and ability level. No individual student or group of students is identified or singled out for observation.

Methods/Procedures

This is a qualitative study using ethnographic methods to research the prevalence and effect of suppositional language use by teachers on students' language in secondary

English classrooms. In order to collect data, I observed each teacher a total of five times and kept field notes of each class period. I also kept a tally of suppositional speech acts used in the class by the teacher. Suppositional speech acts are categorized as *use of modals, expresses a lack of knowledge, admits error, begins and then changes and explanation, encourages/accepts questionable answers from students, encourages challenges from students* and *expresses that knowledge is uncertain/facts can change*. *Analysis*

To review the data I analyzed the qualitative and quantitative data gathered in the observations. I utilized the software Microsoft Excel to create data table and graphs of the numeric tallies.

Results and Conclusions

The data shows that the suppositional style is being used in the secondary English classroom by the four teachers who participated in this study. Teachers A, B, and D used suppositional style speech acts moderately in their classrooms. Teacher C used the suppositional style speech acts very little.
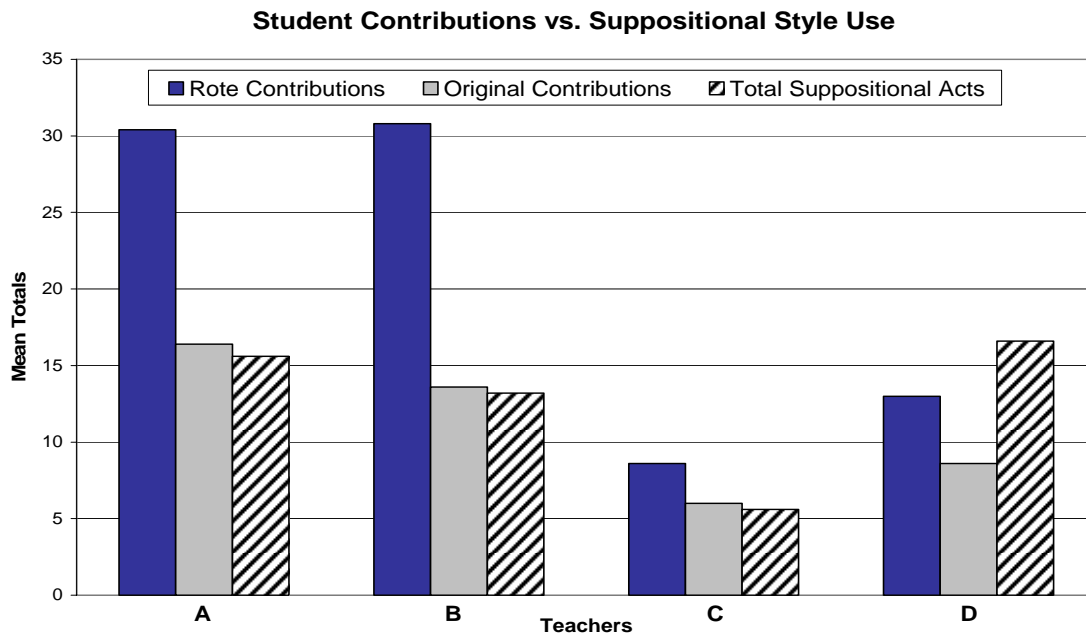
The data also shows that students' verbal contributions are, on average, primarily rote/simple recitation for the four teachers. Student contributions that could be labeled original or hypothetical did occur in the classrooms but with much less frequency than simple recitations responses. The classes of Teachers A and B demonstrate this trend.

As the chart above shows the average number of suppositional speech acts for Teachers A, B, and C are nearly equal to their mean number of original contributions. Only Teacher D used suppositional speech acts with greater frequency on average than his/her average number of rote or original student contributions. Yet the data shows that his/her moderate use of the suppositional style markers does correlate to a higher average instance of original contributions than Teacher C, who used the suppositional style markers very little.

It is not possible to draw any conclusions with certainty about the relationship between the presence of a suppositional style and instances of student contributions that show original thought. The chart (Student Contributions vs. Suppositional Acts) suggests that teachers who employ the suppositional style moderately do have higher instances of original student contributions than those who use it very little. However, as the data tables show, individual days with *high* numbers of suppositional speech acts do not correlate consistently with *high* numbers of original responses for any teacher.

Although it is difficult to draw any conclusions, I can identify extant trends in the data. All four teachers tend to ask questions that encourage students to give simple recitation answers instead of original thoughts. Teachers A and B showed better success at garnering original thought contributions than Teacher D, perhaps because of their tendency to *allow questionable answers* with greater frequency. Teachers A and B responded positively when students offered answers, whether or not they were correct. They acknowledged the response and then usually offered a suggestion to make it better or asked a further question. The data for Teacher D suggests that *changing explanations* and using *modals* is a less ineffective use of the suppositional style and does not correlate with instances of original thought by students. Teacher D asked questions frequently in class but often did not wait for students to respond although the response would have required original thought. The result was a highly teacher-centered classroom, albeit one that employed the suppositional style regularly. A comparison of Teachers A and B with Teachers C and D suggests that classes in which students verbally contribute with greater frequency are more likely to have higher instances of original thought. Simply allowing students to talk more frequently has a positive effect on their willingness and ability to move from recitation to hypothetical thinking.

Overall there does not appear, conclusively, to be a strong relationship between the prevalence of the suppositional style in the four teachers and a greater number of student contributions that show original thought. Equally, the absence of the suppositional style appears to have no effect on the number of original or rote contributions by students.

My inability to draw conclusions with statistical certainty about the effect of the suppositional style on students' verbal contributions is a function of the very limited scope of the research. A teacher's use of the suppositional style provides only a snapshot of their personality and does not explain with certainty the culture of the classroom or why and how students contribute their own voices to class discussions. Teacher demeanor, discipline style and instructional methods are equally important to consider and could not be explained in this research project.

The lessons to be learned for a classroom teacher from this research are to allow space and time for student voices. The more students verbally contribute, the more opportunities they have to express their creative, original, hypothetical thoughts. It is also important to allow students to contribute answers that are questionable, that are under-developed or that are incorrect. Teachers that respond positively to the risk a student takes in contributing at all create an environment in which students can explore a topic, build their own knowledge, and become life long learners instead of students who parrot back information without ever taking ownership of their education and knowledge.

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Vocabulary Instruction in the Secondary English Classroom

Mariah Dillard

With Joseph Milner, Ph.D.

Wake Forest University
Department of Education
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Introduction

Vocabulary instruction is an integral part of the high school English classroom. As a building block for higher-level thinking skills, vocabulary acquisition has a strong role in a student's overall academic success. Learning how to tap into the world of words and explore the intricacies of vocabulary is an exciting task for the secondary English classroom. There are a number of different ways that students absorb new words into their active vocabularies, ranging from direct instruction to learning from natural context. The goal of this research is to look specifically at the instructional methods that four secondary English teachers use to teach vocabulary and what relationships emerge between instruction type and perceived student engagement.

Review of Literature

When students acquire rich vocabularies, they enable themselves in areas of reading, writing, and communication. In validating the use of instructional time for vocabulary instruction, researchers point to the relationship between reading comprehension and vocabulary. Results from a meta-analysis of vocabulary research conclude, "vocabulary instruction does appear to have a significant effect on the comprehension of passages containing taught words" (Stahl and Fairbanks, 1986, p. 100). Particularly pertinent to educational standards today is the finding that "vocabulary instruction also appears to have a slight but significant general facilitative effect on reading comprehension passages in standardized tests not designed to contain taught words" (Stahl and Fairbanks, 1986, p. 94).

In understanding how to facilitate vocabulary acquisition, it is essential to look at the research regarding different methods of instruction. One of the most traditional methods of vocabulary instruction is the definitional approach. In the definitional

approach, students learn the definitions of words by looking them up in the dictionary and memorizing the definition and/or a synonym (Herman and Dole, 1988, p. 45). In the contextual approach to vocabulary instruction, teachers push students to derive the meaning of words from the context of reading passages, rather than looking up the word in the dictionary (Jenkins, Matlock, & Slocum, 1989, p. 215).

In a study conducted by Jenkins et al. (1989), researchers studied the differences between definitional and contextual instruction. Results show that on tests of words knowledge (words-in-isolation test, words-in-context test, difficult and easy multiple-choice tests), scores from the definitional group were better than the contextual group (Jenkins et al., p. 228). However, on deriving meaning tests that measured "student's ability to derive the meaning of unknown words from context" (Jenkins et al., 1989, p. 223), the contextual groups did better than the definitional group on three of the four tests (Jenkins et. al., 1989, p. 232). The results show that the contextual group was successful at medium and high frequency practice groups, but not low level practice (Jenkins et al., 1989, p. 232). Other research shows that the best instructional methods are the ones that are a mixture of both definitional and contextual instruction (Herman and Dole, 1988; Stahl and Fairbanks, 1986).

Furthermore, Duin and Graves (1987) found that when vocabulary is taught intensively in conjunction with writing exercises that use the vocabulary words, students outperform students who study words only intensively or traditionally on measures of vocabulary knowledge, the number of target words used in essays, and the quality of writing on essays (p. 311). In addition, McKeown, Beck, Omanson, & Pople (1985) found that students who engaged in "extended/rich" instruction where they had rich instruction coupled with an activity that pushed students to use words outside of class, performed better on tasks of fluency of access and story comprehension (p. 522; p. 526). Thus, a myriad of different instructional methods exist to aid students in vocabulary acquisition. It is our job, as educators, to discover and utilize the most effective pedagogical practices to facilitate vocabulary acquisition.

Methodology

This qualitative study addresses the following research questions: RQ (1) What types of vocabulary instruction do four secondary English teachers use? RQ (2) What is

the relationship between vocabulary instruction and perceived student engagement? The study took place in the classrooms of four secondary English teachers in a public school in Southeastern, United States. The classes used in the study were mixed in subject (10th, 11th, and 12th grades) and ability level (Standards, Honors, and Advanced Placement).

This study was ethnographic in nature, as it used direct observation of normal educational settings as the only means of data collection. The researcher observed a total of 40 hours of observation. During the observational period, the researcher carefully observed when and how vocabulary instruction occurred during English lessons.

After finishing the observations, the researcher analyzed the field notes and coded the vocabulary instruction as *contextual*, *conceptual*, or *definitional*. The research further coded the contextual data into words obtained from "reading", "conversation" or "teacher chosen". The researcher also coded any type of vocabulary instruction that included writing or morphology study in a miscellaneous category. All data was presented and further explained in narrative form.

Results

The data collected shows that the four teachers included in this study used a variety of different pedagogical approaches to vocabulary acquisition. No teacher relied on one method of instruction; rather each used a variety of *contextual, conceptual*, and *definitional* approaches to vocabulary instruction. In addition, all teachers had students actively engage in writing with vocabulary at some point during the observational period. The large variety in vocabulary instruction found in the four English classrooms made it difficult for the researcher to compare student engagement. Each teacher used unique pedagogical practices to aid students in vocabulary acquisition, which made comparison nearly impossible.

The most informal type of vocabulary instruction that occurred in the four English classrooms was *contextual i*nstruction. The researcher operationally defines *contextual* instruction as any instruction that results from the teacher or students choosing a word to define naturally from context. For the purposes of data analysis, the researcher further broke this category down into "reading" (words defined while reading), "conversation" (words defined during conversation or lecture), and "teacher chosen" (words teachers choose to define in context rather then from definition). Findings show that out of the 87

words coded as *contextual*, 53 were from reading, 23 were teacher chosen, and 11 were from conversation. However, it is important to note, these categories are somewhat fluid in nature and the researcher could have put many words in more than one category.

The researcher also observed that the four teachers used *conceptual* instruction during the observational period. The researcher operationally defines *conceptual* instruction as any instruction of words that represent broader topics of exploration in the English classroom. These are words that students do not simply define with a definition from the dictionary, but rather explore their meanings and connotations at greater depth. In addition, the four teachers also used the *definitional* approach to vocabulary instruction. *Definitional* instruction is operationally defined as any instruction that uses a list of words where students learn the precise meaning of a word, phrase, or term often from the dictionary or a glossary. Teachers used very different approaches to definitional vocabulary instruction during the observational period.

Finally, the researcher observed that the four teachers each included some type of writing activity during the observational period in which students explored vocabulary words. In addition, there were a few instances of exploring words based on morphology. These types of vocabulary instruction were grouped in a miscellaneous category.

Due to the diversity of the methods of instruction, the researcher was unable to determine which type of instruction was most effective. It was unrealistic to compare the diverse pedagogical practices to each other because each type of instruction served a unique purpose in the classroom. *Contextual*, *conceptual*, and *definitional* approaches to vocabulary all have different roles in the classroom, last different durations, and involve different types of student involvement. Teacher, student, and classroom personalities play a large role in determining student engagement rates. Thus, no conclusions can be drawn from the observational data about which methods of instruction produced the highest student engagement.

Conclusions

The results show that the four teachers included in this study use a variety of different instructional methods to teach vocabulary. The researcher found that each approach to vocabulary has benefits depending on the goals of the teacher. *Contextual*

instruction is very beneficial for "teaching in the moment". In the *contextual* approach, teachers are able to address vocabulary issues when questions naturally arise in the classroom. *Contextual* vocabulary also gives students some choice in which words are going to be explored seeing as there are no imposed lists. *Conceptual* vocabulary instruction is very beneficial in exploring words and concepts at a deep level. Finally, the *definitional* approach to vocabulary is beneficial when teachers want to study many words at once. Teachers are able to choose important words in the *definitional* approach, and students have clear guidelines for which words they are expected to know. Thus, the implications of these results are that English teachers should use different methods of instruction depending on the purpose, needs, and goals of vocabulary acquisition.

Student engagement was unable to be recorded because of limitations in the study. The large variety of different instruction made it hard for the researcher to compare such vastly different practices. Another limitation affecting this study was the frequency of observations. The observer randomly chose when to observe during a semester, which made it hard to obtain a sense of student engagement because there was little continuity in observations. A final limitation in this study was that the researcher had no sense of students' vocabulary comprehension. Thus, recommendations for future study are that a researcher should focus on one specific type of instruction, observe classes daily for a shorter amount of time, and administer a pre and posttest to measure comprehension and retention.

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Instructional Methods and Engagement:
An Observation Study of Teacher and Student Behavior

Michael P. Fischer

With Raymond C. Jones, Ph.D.

Wake Forest University
Department of Education
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Introduction

Student engagement is a complex concept that includes scores of internal and environmental factors (Newmann, Wehlage, & Lamborn, 1992). The instructional choices teachers make and strategies they employ daily can help spark heightened engagement with the curriculum (Newmann, 1989). The purpose of this study was to observe the relationship between teacher actions, instructional methods, and identifiable engagement by the students in the secondary Social Studies classroom. In other words, what do teachers do, and what do they have students do, to improve – or impede – engagement by students during class sessions?

Student Engagement

Academic engagement contains motivational, affective, psychological, and behavioral components (Newmann et al., 1992). Greenwood, Horton, and Utley (2002) focused on student engagement as an amalgam of classroom behaviors that enable academic success; the behavioral aspects of engagement are the only features that a researcher, or a teacher, can directly observe. Greenwood, Delquadri, and Hall (1984) identified three classes of student engagement behaviors: positive, neutral, and negative. Each category of student engagement behavior correlated with achievement on standardized tests, and it was shown that observable engagement is predictive of academic outcomes. In following this stratum of the literature, my study focused on the behavioral aspects of engagement to determine students' reactions to different instructional methods.

Variance in Student Engagement

Marks (2000) found that classroom factors controllable by individual educators on the secondary level account for a great deal of student variance in academic engagement.

Inclusion of authentic instructional work explained 21% of variance while 22% was explained by features of a supportive environment. Educational practices at the institutional and classroom levels explain variance of processes and outcomes, thus more effective practices can reduce student disparities (Opdenakker & Van Damme, 2000; Marks, 2000).

The Teacher's Role in Mitigating Variance in Student Engagement

Research shows that elements of a student-centered classroom promote heightened academic engagement. Cooperative learning strategies, one-on-one instruction, and independent work yield higher levels of observable engagement; the same claim is made for accommodating student preferences and giving students choices in instruction and assessment (Cluck & Hess, 2003; Catlin, Lewan, & Perignon, 1999; Oginsky, 2003). The teacher's choice of instructional method has an impact on the students' engagement and, consequently, their academic achievement. My study sought to identify instructional methods actually employed, and then determine which ones promoted higher levels of engagement among secondary Social Studies students.

Methodology

This study was observational and therefore largely qualitative. Four teachers of regular Social Studies students in a suburban school district were selected to participate; the sample was purposive and convenience. The teachers were from two high schools and taught Civics and Economics and U.S. History. Two taught on the block schedule (90-minute periods) and two taught on the traditional schedule (47-minute periods).

The teachers on the block schedule were observed four times and those on the traditional schedule were observed seven times for twenty-two total observations. The Morine and Kounin Systems (McNergney & Carrier, 1981) were used in observations. The researcher used two pre-established sets of behaviors at first; Bush and Johnstone (2000) provide a list of teacher activity codes, and Greenwood et al. (1984) provide a trifurcation of student engagement, positive, neutral, and negative. With the Morine and Kounin instruments, the researcher piloted the teacher classification in the first observations of each participant and modified them as necessary; the student classification did not change.

Data Analysis

The researcher deviated from the anticipated activities and created eight categories specific to the participants: (1) lecture (direct instruction orally presented); (2) lecture with PowerPoint (direct instruction with Microsoft PowerPoint displaying notes); (3) monitoring individual seat work (MISW); (4) monitoring group work (MGW); (5) showing a video; (6) assessing; (7) administrative tasks; and (8) emptiness (nothing administrative or instructional). The first six activities were deemed instructional, and the last two non-instructional. The researcher reported substantial activities, defined as lasting more than five minutes. Table 1 provides the frequency of each activity and the percentage each activity constitutes of both total and instructional activities.

Table 1. Substantial Teacher Activities

	Instructional						Non-Instructional	
	Lecture	Lecture w/ PP	MISW	MGW	Video	Assess	Admin	Empty
Teacher A	7	0	5	0	1	0	2	1
Teacher B	8	0	4	1	0	0	1	0
Teacher C	7	6	2	1	0	2	2	1
Teacher D	5	1	6	0	0	0	5	6
Total	27	7	17	2	1	2	10	8
% Total	36.5	9.5	23	2.7	1.4	2.7	13.5	10.8
% Instruct	48.2	12.5	30.4	3.6	1.8	3.6	N/A	N/A

Figure 1. Observed Student Engagement

Substantial Teacher Activity

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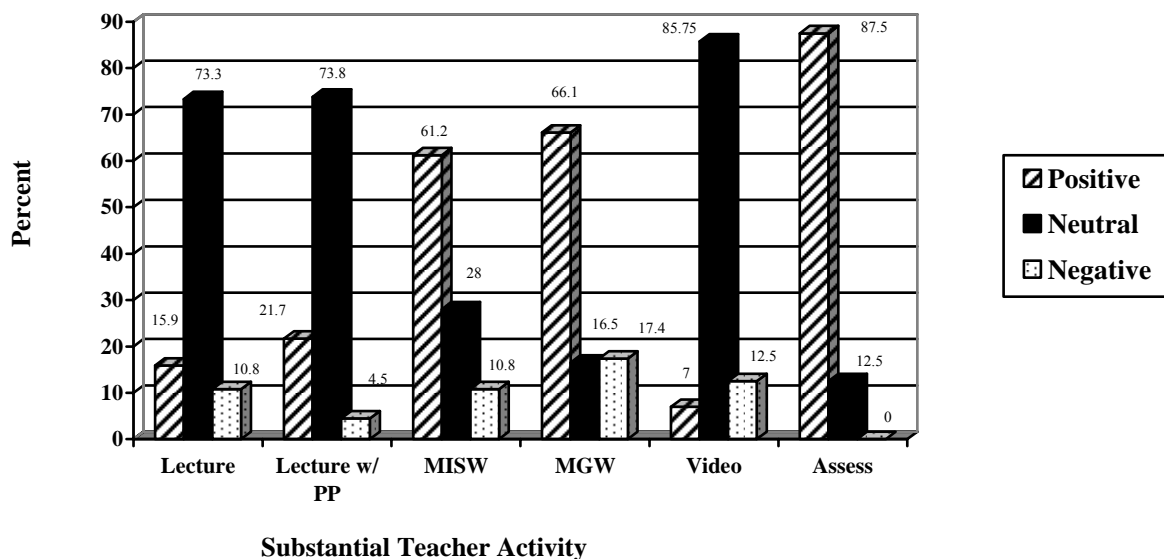
Employing the Kounin System, the researcher divided each classroom into four roughly equal sections and randomly chose a male and female from each section during observations; subjects were chose anew for each session. Over the course of one minute the researcher observed each dyad for fifteen seconds, and given the behaviors exhibited rated each student as positively, neutrally, or negatively engaged. Figure 1 displays the percentage of student behavior falling in each category for each teacher activity.

Discussion

The participants overwhelmingly executed teacher-centered activities; lecturing in any form constituted more than 60% of substantial instructional activities. Teachers A, B, and C most frequently used forms of lecture in their teaching, while Teacher D used lecture equally with all other methods combined. My study exclusively used regular-level classes to control for student ability, but future research involving participants teaching multiple ability levels might yield differentiation of activity choices.

The data show that activities forcing students to be active resulted in more positive engagement. Activities with overt requirements of student action produced higher positive percentages; lecture with PowerPoint (21.7%), MISW (61.2%), MGW (66.1%), and assessments (87.5%) trumped plain lecture (15.9%) and showing a video (7%). When PowerPoint was added to a lecture it is interesting that the neutral percentages remained virtually constant. The difference is seen on the margins with a shift from negative to positive.

The data confirms the link between student-centered activities and heightened engagement; positive rates spike and neutral rates plummet when student-centered methods are employed. Using plain lecture as a base, the comparison to lecture with PowerPoint yields an increase in positive engagement of 5.8 percentage points and a .5 percentage point increase in neutral engagement. Switching to MISW yields an increase in positive engagement of 45.3 percentage points and a 56.8 percentage point decrease in neutral engagement. Keeping lecture as our base against MGW yields a 50.2 percentage point increase in positive engagement and a 56.8 percentage point decrease in neutral engagement. MISW results in an identical negative engagement percentage, and MGW results in a slight increase of 6.6 percentage points. Given the large increase in displays of positive engagement behaviors, some might argue that the slight increase in negative

engagement is a worthy trade-off. These results help provide behavioral evidence to support studies that rely on student self-reports indicating a link between student-centered activities and higher levels of student engagement (e.g., House, 2002).

Conclusion

What do these findings mean to the Social Studies teacher? Most importantly, this study, supported by the literature, tells us that if one relies on teacher-centered activities it is largely impossible to discern whether or not the students are engaged. When participants lectured, with or without PowerPoint, nearly three-fourths of the observed behaviors were neutral. But in contrast, when student-centered activities were utilized the teacher, along with the researcher, had a surge of observable evidence of engagement. This observable evidence can be the basis for the reflective and caring teacher to facilitate learning in his classroom.

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The Effects of Problem-Based Learning on Students Understanding
of Animal Behavior

Shawnda M. Herring

With Robert Evans, Ph.D.

Wake Forest University
Department of Education
December, 2005

Introduction

The recent trend in science education is a push towards inquiry. Inquiry is the process of defining a problem, generating hypotheses, testing, and concluding. However, traditional labs do little to promote inquiry. Often results are known before hand and students simple go through a series of steps to reach the predetermined end.

Problem-based learning is thought to challenge students to think critically about science being that students are integrated into the process of science. PBL has shown a trend in increasing student achievement and interest in science. Yet, there still are mixed results on the effectiveness of PBL.

Gender studies are also of interest, when it comes to student achievement and interest in biology. By the time students reach middle and high school level sciences, the sciences become male dominated and females generally have a negative attitude towards science.

Review of Literature

It is noted that traditional science classrooms use the lecture and textbook format, which requires students to employ rote memorization and does little to challenge students to think about the process of science: building and revising ideas. However, research is challenging this method of teaching and testing on the grounds of multiple intelligences: humans possess a broad range of abilities that the traditional approach to learning and testing pays no attention to (Ochanji, 2000).

To challenge the traditional approach to learning, great emphasis is placed on inquiry based learning. Scientific inquiry is largely defined as a process of asking questions, generating data through experimentation, interpreting data, and forming a conclusion (Sandoval & Reiser, 2003). Applying the knowledge above of traditional

settings, inquiry, and the benefits of inquiry, it has been shown that problem-based learning helps students to develop scientific thinking skills. Problem-based learning is guided inquiry in which the "problem first" approached is used. Teachers are facilitators and guide students as they generate an answer to the ill-structured problem using the scientific method (Chin & Chia, 2005).

 Various studies over a span of years have shown that PBL students perform better on achievement tests than respective control groups (Blumenfeld et al., 1994). Two important factors, when assessing achievement, are teacher experience and time for acclimation (Barrows, 1983; Norman & Schmidt, 1992).

Gender studies are also significant in science. A study by Jones et al. (2000) found that more males than females had outside experiences with science. Females had more biologically oriented experiences (bird watching, making bread) but overall felt science was difficult to understand. Females preferred aesthetics and biology and wanted to "help other people" when it comes to future jobs.

This research plans to investigate whether PBL does improve student achievement when compared to traditional lab methods, and in terms of gender.   Furthermore, this research plans to look at student overall interest in science.

Methodology

Four high school honors biology classes and two standard biology classes were used from two biology teachers. The 6 classes consisted of 153 students: 78 females and 75 males. Two honors and 1 standard biology class were randomly selected to participate in PBL and the remainder participated in traditional lab.

The PBL and traditional lab were designed to take place in one 50 minute class period and to cover the same topics. The PBL was developed from a modified PowerPoint given by researcher Meredith Lentz and the traditional labs were labs normally given by the cooperating teachers.

In the PBL setting, students in groups of four were shown a PowerPoint on female carnivorous fireflies. At the end of the PowerPoint the students were challenged to come up with a hypothesis explaining how the carnivorous firefly lured prey to her. From there students were required to develop an experiment to test their hypothesis. They did not have to conduct experiments, but only present them to the class. In the traditional lab,

students in groups of four had to complete two different lab stations. Students had 20 minutes at each lab in which they learned the same topics covered in the PBL.

Following each class, anonymous students, who had filled out consent forms, were interviewed and asked questions pertaining to the instruction they just participated in and interest in science. The next day, students took a 10 minute quiz on animal behavior.

Results and Conclusion

A factorial ANCOVA was run for the overall sample and for each teacher. The covariate used was standardized District Quarter Test grades. Effects of class size and gender on students' quiz scores were examined.

A main effect of gender found for Teacher B (F=4.74, p=0.003). Female students significantly outperformed male students with means 83.7 and 82.9 respectively. Research suggests that females generally perceive science as difficult to understand (Jones, et al. 2000). Yet, females in this study significantly outperformed males. However, research by Jones *et al.* (2000) finds that females generally prefer biology, while males prefer physical sciences. This study used biology classes as the sample and female preference for the course could have influenced this finding.

A main effect was also found for class type with one teacher, Teacher B (F=10.149, p=0.002). Traditional lab students significantly outperformed PBL students with means of 85.4 and 82.1 respectively. Research has shown that teacher experience influences achievement scores in students (Barrows, 1983).   A lack of teacher experience could have made the PBL instructions unclear to students, who had not previously experienced PBL. For instance, a student in Teacher B's PBL class when asked how they liked participating in lab stated that it was "okay but confusing in a way." Research has shown that, over time, students taught through PBL tend to perform better than students taught by traditional methods. However, this does not occur immediately (Norman & Schmidt, 1992).

When assessing the total sample, no main effect was found for class type or gender. However, an interaction between gender and class type was found (F=3.96, p=0.048). In the traditional setting, males outperformed females with means of 89.1 and

83.9 respectively. However, in PBL, females outperformed males with means of 89.6 and 83.9 respectively. Figure 1 below illustrates this interaction.

Teacher B also showed an interaction effect, a statistical significance was found (F=8.424, p=0.005). Again, males in traditional lab outperformed females with means 92.2 and 81.7 respectively. In PBL, females outperformed males with means 85.6 and 80.0 respectively. Figure 2 illustrates this trend.

Interestingly, for the overall sample and Teacher B the gap between female and males scores decreases in the PBL setting when compared to the traditional lab. This reduction of difference could be completely due to males scoring lower in PBL. In Teacher B's class, male scores dropped 12.2 points, while overall male scores dropped 5.22 points from traditional lab to PBL. Female scores stayed roughly the same.
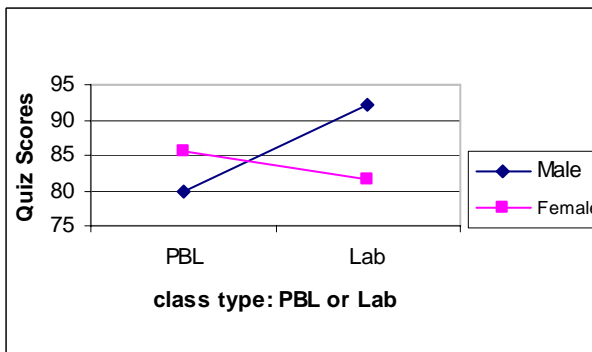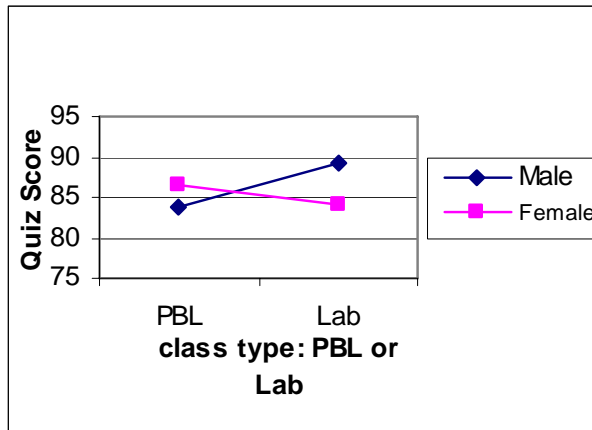
Ochanji (2000) suggests "humans possess a broad range of abilities that the traditional approach of learning and tests pays no attention to." It is plausible that PBL instruction does utilize abilities of students, females in particular, that traditional labs do not permit.

Overall, this research shed light on the difficulty in implementing inquiry with students who are trained in traditional styles of learning. This is noted by the lower averages in PBL classes in which students had no prior experiences. Yet, with time and teacher training, students could get acclimated to inquiry and come to understand science as fluid process, rooted in everyday life. Then again, while PBL showed in increase in female scores, there was a drastic drop in male scores from traditional lab to PBL

settings. This finding warrants further research. Students regardless of lab type and gender preferred lab over traditional lecture and notes, signifying that implementing labs of any type could increase student interest in science.

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Igniting Discussion in the English Classroom

B. A. Hill

With Joseph Milner, Ph.D.

Wake Forest University
Department of Education
December 2005

Introduction: Oral communication is part of our everyday lives; it is clearly important. Yet, oral communication also seems to affect writing. In Student-Centered Language Arts and Reading, K-13, James Moffett writes, "Reading and writing progress little further than the limits of [the students'] oral basis" (1983). Thus, mastery of oral language seems doubly important—as a goal in and of itself as well as a means to a better understanding of written language. Yet, simply talking is not enough. Conversation differs from discourse in that it is not directed by the goal of class (Hogelucht, 1994). However, since discussion is underused in the English classroom, this research project attempts to examine what is needed to successfully ignite discourse, or discussion, in the classroom (Nystrand, Wu, Gamoran, Zeiser, & Long, 2001).

Review of Literature: Many diverse studies agree that classroom discussion is beneficial to students in many different situations—from online classes, ESL, and special education to the college level (Du, et al., 2005, Saunders, & Goldenberg, 1999, Echevarria & McDonough 1993, Pomerantz, 1998). Clearly classroom discussion has the potential to be helpful in every classroom, if we only understand how and when to use it effectively. Yet, many of these studies are wary of directly linking academic success to discussion. In fact, many studies do not actually measure achievement. However, a few studies do propose a strong association (Nystrand, et al., 1997, Nystrand, & Gamoram, 1991a). Christoph and Nystrand later strengthen this connection, writing, "Students' literature achievement clearly correlated with the overall dialogic quality of discourse in their classrooms" (2001). They go on to explain that students had more depth and breadth of knowledge than classes where the discussion was monologic. Yet, despite the evidence promoting discussion, studies have shown that it is highly underutilized in the classroom—only 4.81% of a typical English class involves authentic discussion

(Nystrand, Wu, Gamoran, Zeiser, & Long, 2001). Unfortunately, while many teachers are praising discussion, they are actually using question and answer methods, conflating them with discussion (Nystrand, Wu, Gamoran, Zeiser, & Long, 2001). Many studies agree that recitation takes up the vast majority of class time—not discussion (Christoph & Nystrand, 2001). Teachers are actually asking questions with a correct reply in mind, instead of promoting authentic discussion (Hogelucht, 1994).

VanDeWeghe writes, "We know when discussion is a problem, but we don't always know why—or what to do about it" (2003). Problematically, studies differ greatly on how to best implement discussion. Some call for relevance to students lives (Echeverria & McDonough, 1993). Yet, some praise authentic questions (Nystrand, et al, 2001, Christoph & Nystrand, 2001). Still others believe that the key is to have scaffolding pervading the discussion; this leads to "more complete conceptual understandings" (Many, 2002). In line with this idea of scaffolding, some researchers argue that teachers must take risks, asking their students questions that they are not prepared for (Christoph & Nystrand, 2001). McCann points to questions that raise doubt (2003). Both of these ideas seem to involve getting students into the Zone of Proximal Development—described by Vygotsky as the area where students are pushed to the limits of their knowledge.

If truly dialogical discussion is beneficial and may actually be linked with higher achievement, we need to help teachers understand how to implement and identify this in the English classroom. Thus, this study focuses specifically on questions about initiating class discussion in High School English classes

Research Questions: (1) How do teachers effectively begin discussions? (2) When can teachers effectively begin discussions?

Methodology: Data for this study will be collected by observation. I will observe four classes, ten hours each, taking careful field notes, using a form that I have designed.

The initial focus will be on the teachers' methods of beginning a discussion—based on when (post-lecture, post-activity, or to begin the section of instruction) and how (with an open question, an activity, or a higher or lower level question). Then, I will shift focus to the students; in order to evaluate the effectiveness of the teachers' methods, I must look for engagement and signs of learning. I will base this mainly on the level and

length of the students' responses. After the teacher's methods have been identified, I can watch the least and most engaged students, to attempt to formulate and idea of why the teachers' methods did or did not work well.

To review this narrative data that I have collected, I will examine my field notes using ethnographic methods. Hopefully, themes and categories will arise as I attempt to describe the different methods' efficacy with my information. I will use a narrative passage to convey the findings of the analysis, providing descriptive statistics showing how often methods were used, as well as how often they produced common results, based on student responses and participation. This narrative will focus on the specific aspects I have designated in my schemas for teacher and student action; however, being an ethnographic study, I will be in a position to take into account factors outside of my specific scope, such as a certain teacher's disposition or teaching style, which may hinder or help them when using a certain method. Finally, I can interpret all of my data to see if I can answer my research question and to highlight the need for further research.

Frequency of Use by Type

Legend:
- 1-1
- 1-3L
- 1-3H
- 2-1
- 2-3L
- 2-3H
- 3-3L
- 3-3H

Values shown: 5%, 0%, 2%, 1%, 42%, 47%, 2%, 1%
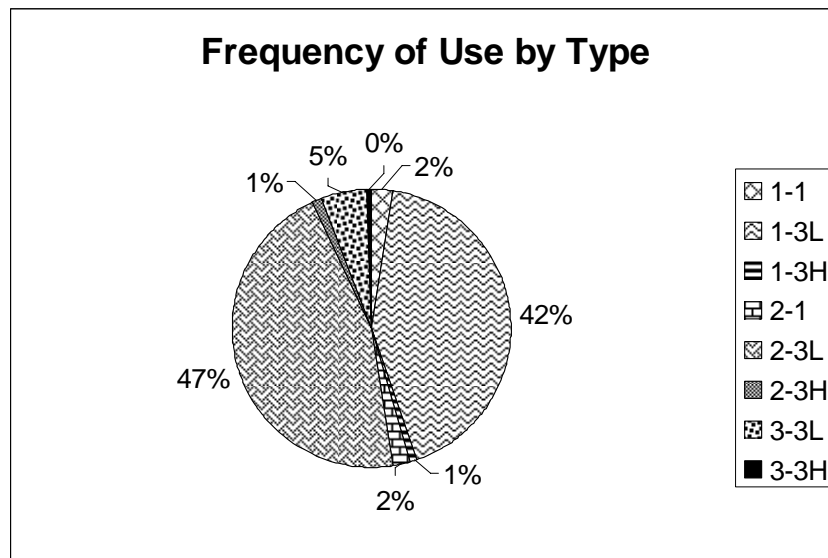
First number (when): 1=beginning, 2=post-activity, 3= post-lecture
Second (how): 1=open, 2=activity, 3=question (H=high, L=low)

Results and Conclusions: While discussion—as the research shows—was underused in the classes I observed, I was able to draw several conclusions from the data. The data shows that 89% of the time trying to initiate discussion was used asking lower level questions; this basically consisted of IRE sessions. Open questions were used 4% of the time, while higher level questions were only used a little over 2% of the time. Yet, the data shows that higher level questions, followed by open questions, are more likely to elicit higher level responses; these responses tend to be longer, drawing in personal experience and inter-text parallels. This

seems to steer the class into a realm of doubt, as experiences vary and parallels between texts are quite subjective. Teachers A and C used the least amount of high level questions and had no episodes of real discussion. Teacher B used more open and high level questions than Teacher D, but sometimes received no responses; Teacher D had the most episodes of real, dialogic discussion—probably because higher level questions were used and, quite importantly, students were allowed to take over the discussion—something that happened less frequently with Teacher B's questions. Thus, the theme of student led discussion emerges.

In Teacher B's periods of genuine discussion, the teacher allowed the students to become the evaluators and questioners, addressing their questions not to the teacher, but to their peers. Teacher B would often say things such as, "I don't know if there is an answer," signaling to her students that they were in charge of evaluating their peers answers—that they needed to discuss it. This points to another interesting finding. Questions with no real answer—questions raising doubt—are inherently higher level

questions; you must analyze, synthesize, and, if the teacher allows it, evaluate.

Thus, it seems that a convergence of conditions truly ignites a dialogic discussion; teachers ask higher level questions which raise doubt and allow the students to become the evaluators and questioners if they wish to start a discussion.
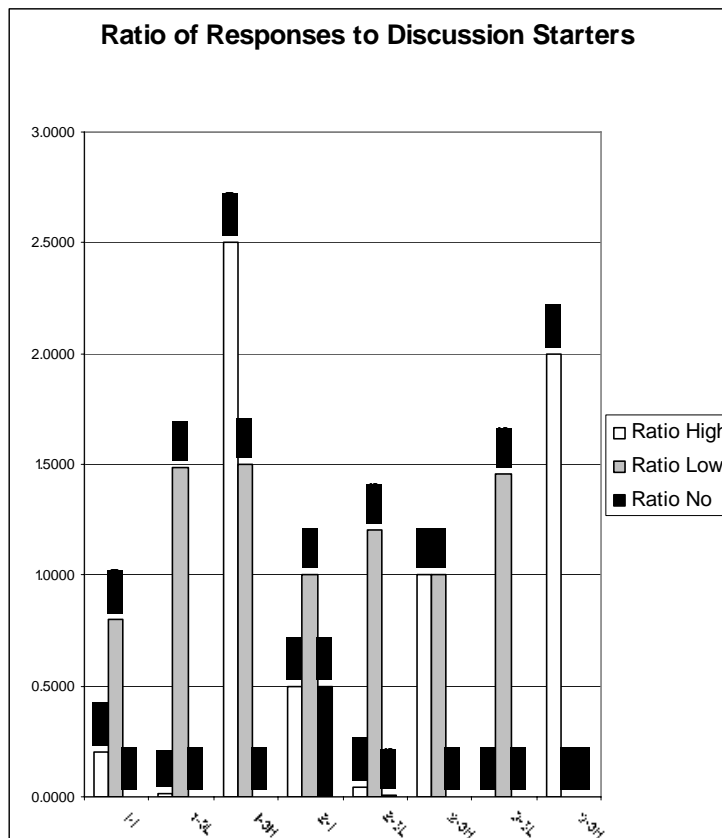
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Instructional Strategies Used to Promote Cultural Awareness

Mary Julia Hinson

With Mary Lynn Redmond, Ed.D.

Wake Forest University
Department of Education
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Introduction and Literature Review

In a global society, students are better prepared to function appropriately within the interconnected world if they are culturally aware. Seeyle (1984) believes that culture is everything that people of the target language learn to do, while Curtain and Dahlberg (2004) maintain that culture is a combination of the language, life, and thoughts of people who use the target language. One who is culturally aware is conscious of multiple viewpoints of the world, tolerant of differences, and has a nonjudgmental outlook towards others (Scott & Huntington, 2002).

Because cultural awareness is essential in both foreign language learning and life in a global society, it is a core component of the *The Standards for Foreign Language Learning in the 21ˢᵗ Century* (ACTFL, 1996) and the *ACTFL Performance Guidelines for K-12 Learners* (ACTFL, 1998). *The Standards for Foreign Language Learning in the 21ˢᵗ Century* were developed to represent the content knowledge that students should have when they complete their study of a foreign language in grades K-12 (ACTFL, 1996). The Cultures goal of the *National Standards* is for students to understand the relationships between the practices, products, and perspectives of the target culture. The *Performance Guidelines* provide a gauge for teachers to measure their students' progress in language proficiency throughout the K-12 continuum. Culture and language are interconnected in the development of proficiency, and as students increase communicative ability in grades K-12, they should also gain an understanding of how to function appropriately in the target culture. For example, students at the novice level should be able to demonstrate an awareness of the similarities and differences between the student's native culture and the target culture. Intermediate learners should develop

an understanding and appreciation for the practices, products, and perspectives of the target culture. At the advanced level, students should be able to use language and behaviors to demonstrate their understanding of and appreciation for the target culture. The *Standards* and the *Guidelines* provide the backbone for teachers' instructional strategies in the foreign language classroom. However, Paige et al. (1999) maintain that *how* students learn culture with a foreign language is largely reliant on each individual teacher's definition, presentation of culture, and adherence to the *Guidelines* and *Standards*.

Different strategies can be employed in the foreign language classroom to provide students with knowledge so that they can become more culturally aware. For example, classroom debates discussing stereotypes can challenge students to analyze their own perception of the world (Abrahams, 2002). Authentic literature and videos can be integrated into instruction so that students can form cross-cultural links (Scott and Hunting, 2002). By giving a variety of cultural assignments, such as portfolios and projects, teachers allow students to research cultural information for themselves, which helps illustrate perspectives and diversity (Allen, 2004; Abrams, 2002). Teachers can also invite native speakers to the classroom to participate in interviews and presentations, as a way to develop students' confidence in speaking and to provide positive exposure to many aspects of the target culture (Bateman, 2004). Other methods of contact with native speakers to promote cultural awareness involve service learning in the community and e-pal interaction (Beebe & De Costa, 1993; Hertel, 2003; Lee, 1998). Additionally, by integrating réalia, music, and art into instruction, foreign language teachers are providing students with a global context through which they can relate the material to gain cultural awareness (Ortuno, 1994).

There are many different methods to link culture and language in the foreign language classroom. The purpose of this study is to examine specific instructional strategies that secondary Spanish teachers use in order to develop students' cultural awareness of Spanish-speaking cultures.

Methodology

The population of this study consisted of ten secondary Spanish teachers from various high schools in the Winston-Salem/Forsyth County Schools in North Carolina.

The teachers were selected according to their willingness to participate, and the study was conducted in two parts. In the first part, the researcher interviewed each teacher in order to obtain the teachers' opinions regarding the teaching of culture, using an instrument designed by the researcher. In the second part, the researcher observed one class of each interviewed teacher to witness instructional strategies that teachers incorporate in order to promote cultural awareness.

Results, Discussion, and Conclusion

All information collected was analyzed and organized according to recurring instructional methods associated with cultural awareness. Regarding instruction, all teachers stated that they teach the practices, products, and perspectives of the target culture, which they take from the textbook *Realidades*. Four teachers said that the *Standards* strictly guide their instructional strategies, and two stated that they use the *Guidelines* specifically for assessing how cultural understanding is reflected in their communication.

The teachers were asked which specific instructional strategies from a given list they use to promote culture. The teachers gave the following responses: language experiences in the classroom (10), reália, videos, authentic food, music, and artwork (10), cultural discussions (10), foreign language events (10), authentic literature (9), cultural projects and cultural presentations (5), and e-pals and service learning (3). When asked which of these strategies engage students the most, five teachers stated that videos interest the students, while four said that authentic food is the most intriguing to them.

In the observations, the researcher found that the practices in which students compare their lives to those in the target culture were most commonly integrated into the lesson to promote cultural awareness. Of the instructional strategies mentioned by the teachers, the use of language experiences, presentations by native-speakers, in-class discussion of cultural topics, and cultural presentations by students were observed in the classrooms. The researcher found that the most commonly used instructional strategies are those which are the most accessible to the teachers, such as presentations by Hispanic students or short, in-class cultural discussions. The researcher noticed that those which provided multiple representations of information and knowledge and that were student-centered captivated the students the most.

Although the teachers of upper-level classes spoke mostly in the target language, the progression of cultural instruction woven into language proficiency did not appear to be consistent. For example, the researcher found that the novice learners were performing as the *Guidelines* descriptors indicate, such as answering basic cultural questions and giving descriptions of cultural events; however, culture was not addressed in the highest level of classes observed, Spanish IV. Although all observed classes which incorporated culture addressed the Cultures *Standards*, the development of cultural awareness did not appear to have a consistent progression from the novice, to intermediate, to advanced learners.

Overall, the researcher learned that cultural awareness is being promoted in most of the classes of the teachers who participated in this study, but it is neither taught as extensively as described in the *Standards*. Although the study revealed an abundance of information on cultural awareness, a more extensive study in which the researcher observes more than one class of each teacher would provide more information on the teachers' individual instructional strategies.

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The Use of Authentic Literature in the High School Spanish Classroom

Cecilia Jiménez-Santos

With Mary Lynn Redmond, Ed.D.

Wake Forest University
Department of Education
December, 2005

Introduction

The use of authentic literature in a foreign language program is an important tool for foreign language educators because it can create a rich cultural context in which students can learn and experience the target language. Authentic literature includes poetry, short stories, novels, traditional literature, plays, proverbs, legends, and fairy tales from the target culture, and it is written in the target language for native speakers (Berman, 2002; Kessler, 1997; Schofer, 1990). The incorporation of authentic literature in a foreign language program provides a variety of benefits when it is carefully selected and implemented. Through the use of authentic materials for foreign language instruction, students have the opportunity to experience both the culture and language simultaneously. The integration of authentic literature in the foreign language program also provides cultural content that exposes students to multiple perspectives and views of the world. According to Curtain and Dahlberg (2004), authentic literature is a valuable instructional tool in the foreign language classroom because it is a resource for cultural information, and it offers opportunities for learners to engage in cultural experiences.

Review of Literature

In 1996, the American Council on the Teaching of Foreign Languages (ACTFL), developed the *Standards for Foreign Language Learning: Preparing for the 21*[st] *Century* (*ACTFL*, 1996). The standards describe the content knowledge that students should have in a foreign language when they complete their foreign language program of study in grades K-12. The national standards are recognized as the Five Cs Goals: Communication, Cultures, Connections, Comparisons, and Communities. These goals are interconnected in the development of foreign language proficiency. The *ACTFL Performance Guidelines for K-12 Learners* (*ACTFL*, 1998) were also developed by the

foreign language education profession and measure language proficiency of learners. Research indicates that it is important for a teacher to consider the National Standards and *Performance Guidelines for K-12 Learners* when integrating cultural issues through literature in a foreign language program (Shrum and Glisan, 2005). The Cultures Goal defines culture as perspectives, practices, and products that are representative of a target culture; hence, authentic literature provides a rich context for these goals to be integrated in the development of cultural awareness. Curtain and Dahlberg (2004) state that cultural authenticity helps learners both develop cultural awareness and make connections and comparisons between the target culture and their own. In order to develop cultural awareness effectively, authentic literature should be purposefully selected and integrated in foreign language instruction through planned topics and themes (Shrum and Glisan, 2005). Research shows that teachers should consider the following when selecting a literary text: language level of the text, language level of the students, interest level of the students, and the use of a variety of genres, cultural themes, and vocabulary (Frantzen, 2001; Omaggio, 1993; Schofer, 2002). Authentic literature provides a context to link the culture represented with language and subject content. Through the use of authentic literature in the foreign language program, teachers are able to develop students' cultural awareness while helping them gain proficiency in reading and writing. In the secondary Spanish program, for example, authentic literature can be represented through perspectives, practices, and products from Spain or any Latin American country. The purpose of this study is to examine: 1) the criteria that high school Spanish teachers employ to select authentic literature and 2) the instructional strategies they use to incorporate authentic literature in the Spanish language classroom to develop cultural awareness for various levels of learners.

Methodology

In order to determine the criteria that high school Spanish teachers use to select authentic Hispanic literature as well as the instructional strategies they employ to integrate the literature in their program, the researcher conducted a two part study. Ten high school Spanish teachers from the Winston-Salem / Forsyth County School District in North Carolina were recommended by the researcher's advisor to participate in this study. These teachers currently teach Levels I through Advanced Placement (AP).

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In the first part of the study, the researcher interviewed each teacher for approximately 45 minutes during the months of October and November 2005. The interview instrument included twenty questions about specific criteria used to select authentic literature and instructional strategies employed to incorporate the literature in the program. In the second part of the study, the researcher observed one class of each teacher during November and December 2005. The purpose of the observations was to investigate how the high school Spanish teachers use instructional strategies they discussed in their interviews to develop students' cultural awareness. All the data collected was reviewed in order to identify the most common selection criteria and instructional strategies used by the participants in order to develop cultural awareness.

Results and Conclusion

The results of this research study revealed that the language level of students is one of the most important criteria in the teachers' selection of authentic literature. All ten teachers pointed out that the criteria selection can vary from level to level in the Spanish program. All teachers said that the most common authentic literary genres for beginner's learners (Levels I and II) in this study were: selected short passages from simple short stories (nine teachers), song lyrics (five teachers), simple poetry (nine teachers), legends and fairy tales (ten teachers), traditional literature (nine teachers), proverbs and sayings (ten teachers). These results are summarized in Graph 1.
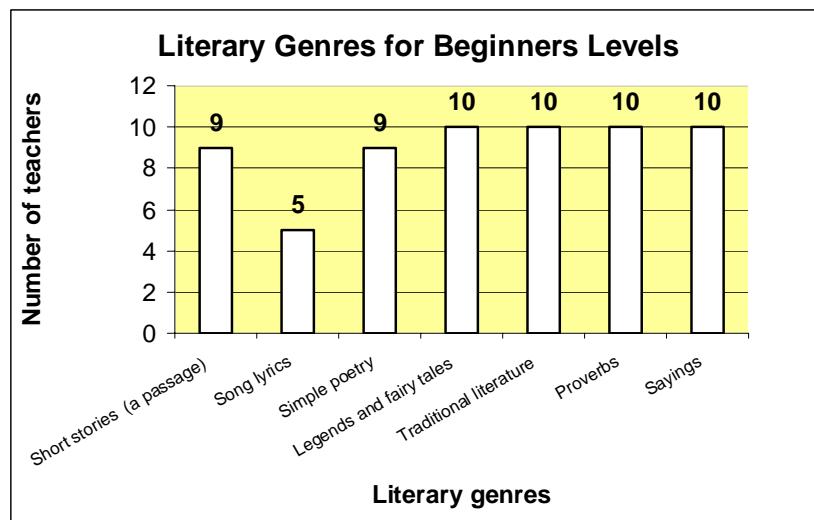
Graph 1

These selections were incorporated primarily because students are learning to read in the target language and to comprehend the gist of the text while identifying grammar structures. The researcher found the following responses to be the most frequently given in more advanced Spanish classes (Levels III-IV): poetry (five teachers), short stories (three teachers), song lyrics (nine teachers), fairy tales and legends that use some idiomatic expressions (four teachers). The findings are summarized in Graph 2.

Literary Genre for Intermediate Levels

Genre	Number of Teachers
Poetry	5
Short Stories	3
Song Lyrics	9
Fairy Tales and Legends	4
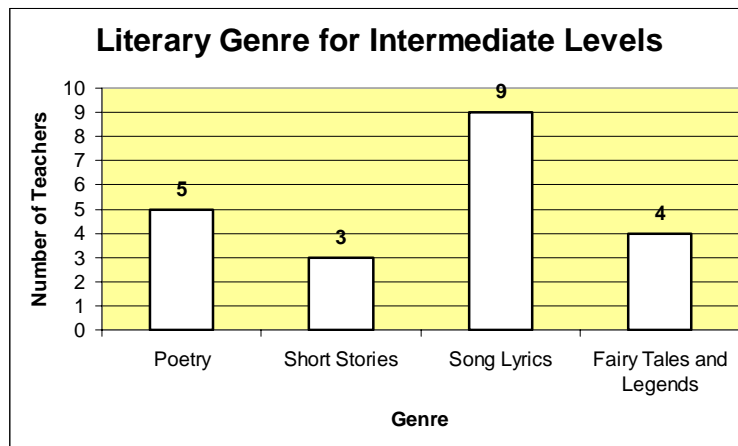
Graph 2

The researcher found that in the advanced levels (Level V or Advanced Placement), the criteria to select literature were based on the difficulty of the language level. In these higher levels, five teachers reported that students are completely exposed to the target language and to literary analysis and discussion. In other words, all ten teachers agreed that the language level is one of the most important criteria because if a text is too difficult for students, they will be unable to understand meaning which may cause resistance to read in the foreign language for many students.

This study also illustrated that in all Spanish levels, all teachers use similar strategies to incorporate authentic literature in their instructional practices. The majority of teachers interviewed and observed are currently implementing authentic texts for different purposes: to connect it to a thematic unit (eight teachers), to reinforce grammar concepts as well as to develop language proficiency (ten teachers), to engage students in cultural experiences (nine teachers), and to develop students' cultural awareness (ten teachers). The most common strategy that all ten teachers are using to incorporate the literature in their instructional practices is through reading strategies: pre-reading, while-

reading, and post-reading activities. These results revealed that teachers are using instructional strategies that support the research regarding effective practices that develop students' cultural awareness (Curtain and Dahlberg, 2004). Through this study, the researcher found that the Comparisons, Communications, and Cultures Goals of the *ACTFL Standards for Foreign Language Learning* were incorporated in the teaching of literature.

The researcher concluded that is important to continue an in-depth investigation in order to more fully understand the most effective ways to integrate authentic literature. Examples of authentic reading selections that should be used at each level of Spanish as well as the instructional strategies that are most effective when incorporating these in the foreign language program should be further examined. The researcher is also aware that a study conducted over a longer period of time with more classes observed can provide additional valuable information regarding the use of authentic literature in the Spanish classroom.

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Discussion and Student Engagement in the English Classroom

Kimberly S. Jones

With Joseph Milner, Ph.D.

Wake Forest University
Department of Education
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Introduction

Recent research has given much attention to the concept of open discussion in the English classroom. Researchers have sought to determine if such open discussion benefits the overall success of students or if these open conversations merely detract from valuable teacher lecture time. While, I understand that it is important to question whether discussion improves student involvement, I also believe it is crucial for effective teaching to determine what kind of discussion groups work best in various classroom settings. If teachers attempt to implement open discussion in their classrooms without considering the specifics of their students' abilities and interests the exercise will be ineffective. To address this situation I have conducted a study that asks: How does student engagement and participation in discussion vary in different discussion constructions and how do teachers facilitate it? In addition how does the age and level of the class (honor, regular, practical) effect student engagement in various discussion models?

Review of Literature

It has been shown that discussion improves the performance of students from all levels of English proficiency (Saunders, & Goldenberg 1999). Some studies even propose a strong association between discussion and achievement (Nystrand, et al., 1997, Nystrand, & Gamoram 1991a) and discourse has been linked with learning (Cazden, 1988). Camden notes that classroom communication is a central issue in school systems, because spoken language is the medium by which much teaching takes place. Pomerantz reports that inclusion of classroom discussion as a regular facet of classroom life has been shown to further students' construction and appropriation of new knowledge and skills, as well as the teacher's ability to assess and respond to students needs (1998). While the widespread belief is supportive of classroom discussion the definitions of what constitutes a discussion has varied amongst researchers.

Yet, despite the evidence promoting discussion, it has been shown that it is highly underutilized in the classroom—only 4.81% of an English class involves discussion (Nystrand, Wu, Gamoran, Zeiser, & Long, 2001). Nystrand and company believed that the lack of discussion in the English classroom was directly related to student questions which in many cases are the catalyst for class discussion, as well as teacher questions. In fact, most teachers use question and answer methods, conflating them with discussion (Nystrand, Wu, Gamoran, Zeiser, & Long, 2001).

While such research is beneficial in illuminating possible techniques for establishing and nurturing discussion, it relies heavily on student ability to maintain the discourse. Maloch points out that there are problems with student led discussion (2002). While maintenance might not pose a problem for higher level students, the question remains if such tactics work as effectively in lower level classes. Problematically, studies differ greatly on how to best implement and maintain discussion across all levels. Evans focuses on the students' perceptions, showing that teachers must look to the students first to properly facilitate discussion (2002).

Other studies call for a new way to talk about literature, to effectively use discourse in the classroom (Marshall, et al., 1995). In their examination of English classrooms the researchers found results similar to those previously mentioned in the cases of teacher-led discussions. Teachers, in an effort to "lead" the class discourse teachers, most often dominated the discussion with their turns lasting two to five times longer than those of the students (1995).

<u>Methodology</u>

a. This is a qualitative study using ethnographic methods to research discussion constructions and student engagement in English classes and the methods teachers use to facilitate class discussion and encourage student involvement.

b. In order to measure the study, I visited four English classes, two high-level and two low-level. I took field notes during 5 observations of each class in order to observe the type of discussion constructions used in the classes. I used a self-generated student engagement form to chart the involvement and interest of students in discussion activities. I included all of the academic discussion that occurs in the classroom in my study. I did not include non-academic activities.

c. To review the narrative data I analyzed the field notes using ethnographic methods. I coded and categorized the types of discussion (collective/group or partnered), teacher facilitation, and student engagement. I looked for themes found in the high and low level classes and across grade level. Then, I used these themes to interpret the relationships between teacher facilitation and construction of class discussions and levels of student engagement. Finally, I reported my findings in a narration highlighting the various teaching methods used to organize class discussion and the student engagement levels.

Results

(1) How does student engagement vary in different discussion constructions in the high school English classroom?

Across the four classes it was observed that positive student engagement was highest in instances of collective discussion. Students responded both independently and when called upon at a greater rate when the discussion was led by the teacher but conducted as a whole class dialogue. It is important to note that the high engagement rates for collective discussion are directly related to the lack of occurrence of group/partnered discussions. In the 20 hours of instruction I observed only 2 group discussion constructions were used. However, even in these two instances of group/partnered discussion the rates of unproductive student engagement, talking to the side and general distraction, were higher and positive student engagement, note taking or independent responses were not significantly increased.

(2) How do teachers facilitate discussion?

Immediately, one of the most significant and surprising facts I observed in my research was the gross lack of discussion of any form in some of the classrooms. Teachers C and D relied most heavily on teacher lecture and individual work to guide instruction their classrooms. In fact during my 5 observations of their classrooms each of these teachers only employed discussion as a teaching/learning tool twice. However in the classes where discussion was employed on a more frequent basis, the teachers most often took active roles in its organization and implementation. Teacher A had the greatest positive student engagement in their class discussions. This seems to be a direct result of the active role they took in encouraging discussion by asking probing questions to initiate discussion.

The teachers with higher discussion and student engagement rates also sought to bring subjects of personal interest into the academic discussion to encourage student involvement. It is important to note that despite a lack of frequent class discussion in the classroom of Teacher C, on the two instances when discussion was implemented this teacher had the lowest occurrences of negative student engagement, students talking to the side or completely off task/distracted. This is a direct result of the behavioral environment this teacher has established in their classroom. When the class engaged in collective discussion, even though many students did not independently contribute, those who remained quiet were respectful with the majority actively listening or taking notes.

(3) How does the grade and level of the class (honors, regular, practical) effect student engagement in various discussion models?

The classes that had the highest positive student engagement rates in this study were 10th grade Honors English II Seminar courses. The classes that had the lowest positive engagement rates were 10th grade English II Regular courses. The 12th grade English IV classes that were observed had the highest rate of negative student engagement and the courses with the lowest rate of negative student engagement were 10th grade English II regular courses. While the numbers alone would lead to a conclusion that younger students in higher level courses react better to discussion in the classroom, there are a number of significant factors that impede such a conclusion from being drawn. In this study my observations led me to find that teacher facilitation played a far greater role in determining student engagement than student age or course level. A pertinent example of this is the consideration of the English Competency class taught by Teacher A that was observed. In this course class discussion was implemented with very low level students and it was met with a majority of positive student engagement. This positive response however, only came after Teacher A took a significant portion of class time to first assess the behavioral state of his students, address their immediate frustrations, and then actively guide them into a discussion of the day's text.

Likewise in the 12th grade English IV class, while the student engagement numbers in isolation might lead to a conclusion that discussion does not work as well with older students, it is more likely that the facilitation of discussions did not successfully match the abilities or interests of the students. Teacher B, although frequently organizing

discussion around relevant academic and social subjects for senior students, occasionally failed to draw on the momentum of the students. When students were interested in pursuing a specific angle within a discussion more so than another, this interest was not always acknowledged, and in failing to do so the teacher often lost students to side conversations with each other.

Limitations & Implications

The brevity of this study leaves much of the results open for great contention. It is extremely difficult to assess the effectiveness or weaknesses of discussion in the English classroom when observing only 4 teachers 5 times each in their classrooms. The structure of the academic calendar must also be considered as an impediment to effective discussion as the teachers and classes I observed had to plan their lessons and work with quarter tests and End of Course tests in mind. Given the evidence within this study that suggests that teacher facilitation of discussion in the English classroom has a greater effect on positive student engagement than age or course level, I believe the most valuable future research for educators and students alike should now focus on specific teacher acts within class discussion that produce the greatest amount of student response.

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The Extent to Which Primary Sources in the Biology Classroom Are a Tool for Teaching Scientific Literacy

Meredith Lentz

With Robert Evans, Ph.D.

Wake Forest University
Department of Education
December, 2005

Introduction

The *National Science Education Standards* (1996) caused a change in the focus of science education from product-oriented learning of facts to a goal of scientific literacy (CMSEE, 1996). Scientific literacy encompasses more than the products of science to include its social setting, its relationship to technology, and the modes of scientific inquiry. Along with this change in focus comes the change in materials to support learning in all areas of scientific literacy. Primary sources, such as scientific journal articles, are one possible means of teaching scientific literacy. Unlike secondary sources, such as textbooks, journal articles explain how and why the research occurred and examine the conclusions drawn from real data. This study attempts to determine the effect of reading primary sources versus secondary sources on content knowledge, inquiry skills, and student attitudes.

Review of Literature

Secondary sources, such as textbooks, often become the sole resource in a science class because of their grade level specific vocabulary and succinct manner of presenting information. However, studies have shown that textbooks fail to address all aspects of science, focusing mainly on content, rather than process (Lumpe and Beck, 1996; Chiappetta, Fillman, Sethna, 1991). An alternative lies in primary sources, such as journal articles, which offer several benefits for the student. Journal articles focus on both product and process of science and include higher order inscriptions, such as histograms or scatter plots, more often than classroom textbooks (Bowen & Roth, 2000). Whereas textbooks generally present only one graph with a short caption to illustrate a point, journal articles include several graphs with longer captions to help interpret the inscription (Roth, Bowen, & McGinn, 1999).

Primary sources have been used in classrooms, though mainly on the college level (Janick-Buckner, 1997; Muench, 2000). For high school, Yarden, Brill, and Falk (2001) suggest a technique for adapting primary sources to help high school students access the information. Using this technique, Baram-Tsabari and Yarden (2005) looked at the effects of reading a primary versus secondary source on high school students in Israel. Their results showed an increase in inquiry skills with some negative effects on content knowledge and attitudes. Several factors make this study difficult to generalize to American high school students. Therefore, this study will seek to measure the content knowledge, inquiry skills, and attitudes of students who have been guided through a reading of a primary or secondary source.

Methodology

Six high school biology classes, of different types (EC, regular, Honors) with different teachers, took part in a guided reading of a text on migration from either a primary or secondary source on the same day. The primary source was adapted from the Avens and Lohmann (2003) article in the *Journal of Experimental Biology* following the adaptation technique of Yarden, Brill, and Falk (2001). The secondary source was developed to provide the "textbook" version of this primary source, by combining text from five high school biology textbooks. Teachers randomly assigned students to read a primary or secondary source by drawing numbers out of a hat. Students were given their assigned text and the teacher gave instructions orally.

Students were then allowed to read the articles at their own pace. As students finished the reading, they completed a reading guide corresponding to their assigned text to help focus their attention on the important aspects of the text. As the students worked on their reading guides, the teacher moved around the classroom answering students' questions. Students were given one hour to read the text and complete the reading guide. At the end of the hour, all texts and reading guides were collected.

The students were then given 30 minutes to complete a posttest. The posttest included 6 multiple choice questions, testing for content knowledge, and a set of 8 attitude statements scored using a Likert-style scale. A third section tested experimental design skills by asking students to design an experiment to test the hypothesis that a species of birds use the stars to migrate. A second question tested experimental design

skills by asking what would happen in the experiment if the hypothesis was correct. Both questions were scored using two rubrics, both with rater agreement of 90%.

Based on their posttest scores, nine students were invited to participate in an interview with the researcher to gather qualitative data. The students were selected on the basis of their score on the posttest, such that three students represented each of the categories: high score, low score, and near average score. However, only those students who returned a consent form were able to participate in the interview.

Results and Conclusions

Analysis of post-test scores, across the six classes using an independent t-test, found that students, who read the primary source, scored significantly higher on the experiment interpretation section ($t = 2.705$, p = 0.008). Content and experimental design scores were not significantly different across all classes.

However, when the posttest scores were analyzed within classes, to account for differences in class type and teacher, several significant differences were found when using a t-test. In overall posttest score (Figure 1a), content (Figure 1b), and experiment interpretation (Figure 1c) two of the six classes showed significant differences. All differences were in favor of primary sources. No classes showed significant differences in experimental design score.

In another study, Baram-Tsabari and Yarden (2005) found that high school students who read primary sources demonstrated lower comprehension than secondary source readers. The content knowledge results from this study do not support the findings of Baram-Tsabari and Yarden (2005) (Figure 1b). Janick-Buckner (1997) noted that class discussions and reading guidelines are important in using primary sources in the classroom. Unlike Baram-Tsabari and Yarden (2005), students in this study were given significant guidance in reading their texts, using the reading guides and the teacher to answer their questions, which may explain the differences in results.

However, the results of this study do support the findings of Baram-Tsabari and Yarden (2005) in that secondary source readers demonstrated better inquiry skills than secondary source readers (Figure 1c). Much literature shows that textbooks are highly product oriented and lack many characteristics necessary to teach scientific literacy (Chiappetta et al, 1991; Norris and Phillips, 1994; Lumpe & Beck, 1996; Musheno and

Lawson, 1999; Knain, 2001). Literature has also shown that primary sources are very process oriented and contain many characteristics that encourage scientific thinking (Roth, Bowen, & McGinn, 1999; Roth & Bowen, 2002). It was hypothesized that these product-oriented characteristics of primary sources enhanced students' inquiry skills.

Figure 1a. Class 3 (t = 2.500, p = 0.021) and class 4 (t = 2.392, p = 0.025) showed significant differences.

Student interview data support that the secondary and primary texts used in this study mirror the fundamental differences in these two types of text. For example, in response to the question "what did you like about the article", three of the six interviewed students pointed out these differences in the primary source, when compared to the secondary source:

- It gave me examples.
- It didn't list definitions.
- The illustrations, because if I didn't understand the reading I could look at the   picture. It's not like that in our book sometimes.
- I liked the specifics. Most things we read, like the science books, are general.

Figure 1b. Classes 1 (t = 2.060, p = 0.050) and 3 (t = 2.556, p = 0.018) showed significant differences.

The results from the attitude surveys of the posttest also contrasted to the findings of Baram-Tsabari and Yarden (2005). A t-test shows that there is no significant difference between the overall attitudes primary readers held towards their text and overall attitudes secondary readers held towards their text (t = 0.051, df = 125, p = 0.959).
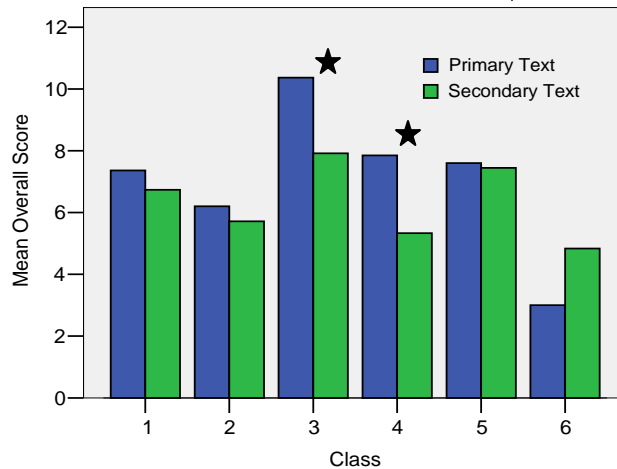
It is, therefore, concluded that primary sources do offer a possible resource for high school biology students. The results of this study suggest that students who read primary sources versus secondary sources demonstrate enhanced content knowledge and experiment interpretation, with no significant difference in experimental design skills or overall attitude towards the reading.

Figure 1c. Classes 3 (t = 2.500, p = 0.021) and class 4 (t = 3.721, p = 0.001) showed statistical differences.

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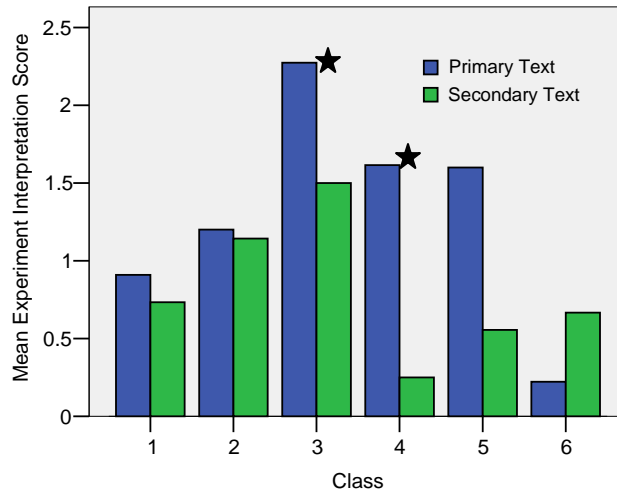Avens, L. & Lohmann, K.J. (2003). Use of multiple orientation cues by juvenile loggerhead sea turtles *Caretta caretta. Journal of Experimental Biology,* 206, 4317-4325.

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Mathematical Discourse During Investigations: A Comparison Study

Diana Liberto

With Leah P. McCoy, Ed.D.

Wake Forest University
Department of Education
December, 2005

Introduction

Communication is an essential part of the teaching and learning of mathematics. Through communication students can share ideas, clarify understanding and verbalize their mathematical processes. The communication process helps build sense and meaning for any mathematical concept (NCTM, 2000). Communication in a classroom can occur between teachers and students or between students and students.

Currently in many mathematics classrooms, direct lecturing is the primary method of teaching mathematics (Bernero, 2000). A traditional high school mathematics classroom is teacher-centered, meaning all the intellectual authority is placed with the teacher and little or none is place with the students (Stein, 2001). To help create a student-centered classroom, more and more schools are requiring that cooperative learning and small group settings be integrated in lessons across all disciplines.

Literature Review

There are many benefits that occur when cooperative learning is used in today's classrooms, especially in mathematics. Cooperative learning can be used to practice skills, investigate ideas, discover concepts and collect data. It also works well with technology instruction, peer tutoring and strategies such as brainstorming and reviewing (Artzt, 1994). Not only is cooperative learning beneficial because it can be integrated into many mathematical lessons, but it can also be used to create a positive school climate, increase mathematics retention, and force students to verbalize their mathematical processes.

Some studies have shown that cooperative learning has benefits in a mathematics classroom. One study done by Bono (1991), found that cooperative learning had an overall positive impact on students in a mathematics classroom. The results of his study

specifically found that students improved in positive attitude towards mathematics, enjoyment in mathematics activities and level of engagement on task when in a cooperative setting. In a similar study, the researcher found that this type of learning created a more positive attitude towards mathematics and a student preference for working with partners. When students worked together test scores also increased and students gained a sense of responsibility for the group and work produced (Bernero, 2000). Another study conducted in a similar way showed that learning was enhanced for all members of the group no matter their ability level (Davidson & Pearce, 1988).

To help encourage cooperative learning, The National Council of Teachers of Mathematics (NCTM), has recommended that instruction in mathematics rely less on the teacher and more on small group learning (Bell, 1978). NCTM's *Principles and Standards for School Mathematics* (2000) has a new vision for mathematics classrooms, which is centered around mathematical discourse. By far, the key element in cooperative learning is student talk, also known as discourse. Discourse is defined by NCTM as the ways of representing thinking, talking, agreeing and disagreeing (NCTM, 1991).

Arguably more important than the mathematics talk that goes on between a teacher and their students is the mathematics talk that occurs between classmates. In a study preformed by Leikin and Zaslavsky (1997), students in a low level 9th grade mathematics class were placed in a cooperative group setting. The results showed all of the benefits of cooperative learning such as student engagement, positive attitude towards mathematics and participation in verbal interaction. Davidson and Pearce (1988) concluded that in cooperative learning groups everyone will learn something relevant to the topic, no matter their ability level.

In a study by Greenes, Schulman and Spungin (1992) students were given mathematical problems that would require them to communicate their reasons for choosing an answer. The researchers concluded that to develop communication skills and enhance understanding of mathematics, students must be given problems that stir their curiosity and stimulate the need to describe, to justify and to explain (Greene, 1992).

Methodology

This study addresses the following research questions: What types of mathematical discourse occur during group work and what can a teacher do to help students to communicate mathematically during group work?

This study involved seven high school students who were taking Advanced Functions and Modeling. Three of these students were in one class together and their desks were connected. The other four students were in a different group together and were in a different class. Group A, made up of 3 students contained one Caucasian male, one Caucasian female and one African American female. In this study, I will use pseudo names to refer to the students. Group A members were Andy, Amber and Angela. Group B, made up of 4 members contained three Caucasian females and one Caucasian male with a physical disability. These students are referred to as Barbie, Beth, Brittany and Ben.

Each group was given the same investigations to complete. The first investigation that was observed for this study dealt with mean, median, mode, quartiles and box-and-whisker plots. The second investigation dealt with standard deviation. The students were graded on their investigations with an individual and group score. The time that was allotted for each investigation was based on the time the class as a whole needed. Each group was videotaped for a total of two assignments. After watching the videotapes of each investigation, data was collected through an observation checklist.

After observation of the two groups of students through two assignments, all students in the two groups were interviewed individually. During the interview process, students were asked questions related to their feeling towards group work in a mathematical setting.

Using the videotaped classes and the individual interviews, data was analyzed and results and conclusions were made. The data was analyzed by comparing the mathematical and non-mathematical statements made by each group. The individual interviews were also compared as well as contrasted between the two groups and between individual group members. Groups were also compared by their attitude towards cooperative learning and their group morale.

Results

Using the observation checklist the statements made by the students were summarized by combining the total for each group from both investigations. There are some obvious differences that can be observed between the two groups. Group A provided assistance with justification, sought clarification, accepted answers, defended answers, rejected answers and compared answers more than Group B. Group B had more statements under the following categories than Group A; providing assistance without justification, requesting help and getting off-task. Overall Group A had more statements that dealt with good mathematical communication/discussion. Both groups had been exposed to the pod set up in this classroom for the same amount of time and had been with the same group members since the beginning of the year (about two months). The fact that Group A constantly and continuously had better math talk is obvious from the table. The results of this study showed that Group A out-performed Group B in both investigations when comparing the amount of mathematical discussion and the level of cooperation.

Categories	Group A	Group B
Provide Assistance with Justification	38	28
Provide Assistance without Justification	18	32
Request Help	15	25
Seek Clarification	47	19
Evaluate and Compare Answers	22	11
Accept Answers	18	16
Reject Answers	6	2
Defend Answers	16	6
Off-Task	7	27

Conclusions

Both of these groups had been exposed to group work, had completed investigations with their group since the beginning of the year and had received the same set of directions from the teacher. So, what caused Group A to out-perform Group B? The major variable in this study was the students and what they brought to their group. Each group had the tools and the capability to work together in completing this task. Group A did, in fact, complete each task as a group while Group B completed their tasks individually. One major difference between Group A and Group B was that Group B had

no leader. Members of Group B did not have distinct roles. They did not naturally fall into roles as well as Group A. Group B could have benefited from assigned roles.

Working as a group is a skill that is learned. Some students will be able to discover this on their own (Group A) while other students may not (Group B). A teacher's guidance can play an essential role in facilitating successful mathematical discourse. The teacher needs to know which groups need more attention and guidance.

Implications

The results and conclusions found in this study can be used in mathematical classrooms today. A teacher's idea of a successful group assignment is students speaking mathematically and working together to solve a problem. There are multiple reasons why these assignments may not be successful. This study has shown two important practices that should be considered when assigning group activities. The first thing this study showed is the importance of roles. Group A had distinct roles while Group B did not. In a situation like this, it would be beneficial for the students if the teacher gave them individual attention and focused solely on operating as a group. Once the groups have been created it is essential for the teacher to go over distinct roles, which should occur within the group. Secondly, a teacher needs to go over how a group operates. This may be something the teacher needs to emphasis more with one group over another.

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Verbal, Academic Teacher Feedback in Secondary English Classrooms

Kerri McFarland

With Joseph Milner, Ph.D.

Wake Forest University
Department of Education
December, 2005

Introduction

Teacher feedback can affect student attitudes toward school and specific subjects, and it can encourage or stifle independent thought. It is a constant aspect of the classroom environment and blends with the curriculum to provide "direction for student learning" (Walsh & Sattes, 2005, p. 97). Although much research has been done concerning teacher feedback, this study focuses on the secondary level and looks exclusively at verbal, academic feedback to determine what types are being used in secondary English classrooms and the effect of this feedback on student engagement.

This study also considers the variable of student gender. Some research indicates that teachers' responses and evaluations differ according to the gender of the student, and various studies have shown that males receive more teacher feedback and more specific, instructive feedback than females (Hulley, 2001). With this in mind, the study examines if student gender has any effect on teacher feedback.

Review of Literature

Teacher feedback is a vital component of the classroom, and according to Konald, Miller, & Konald (2004), it "plays a critical role in the teaching/learning process" (p. 64). Although feedback in the classroom is often thought of as a way to bring closure to student answers and comments, it is also a tool that can extend student thinking, deepen understanding, connect new knowledge to prior experience, and generate student enthusiasm and motivation (Walsh & Sattes, 2005; Sternberg & Williams, 2002). The benefits of effective feedback can extend beyond the particular student to whom it is directed, for all students in a class can "profit from feedback that is instructive, instructional, and focused" (Walsh & Sattes, 2005, p.102). Thus, as Sternberg &

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Williams (2002) note, "feedback is of central importance in developing expert learners" (p. 363).

Although teacher feedback can be powerful in the classroom, some research suggests that not all students are being treated equally when it comes to teacher feedback. Sadker & Sadker (1986) and Irvine (1986) found that teachers give male students more attention and more time to talk in class. Research also indicates that males receive substantially more of the most important kinds of feedback—feedback that instructs, clarifies, and encourages (Sadker & Sadker, 1986). Kelly (1988) performed a meta-analysis of findings concerning gender differences in student-teacher interactions and found that "teachers consistently interact more with boys than with girls" (p.13). On average, 56% of teacher interactions were involved with males and 44% with females. Although a difference of 12% seems small, it culminates over many years of schooling to be thousands of less instructional hours for females. The term "micro-inequalities" was coined by Rowe of MIT to describe exactly this type of small, everyday, unequal interaction that has miniscule results in isolation but creates a cumulative effect of unequal opportunity (Sandler, Silverberg, & Hall, 1996). These "micro-inequalities" are dangerous because they have been linked to the tendency for girls to lower their expectations of themselves and doubt their abilities (Hutt, 1979).

Methodology

This was a qualitative study that used ethnographic methods. The subjects were four teachers at a secondary school in Forsyth County and their students. I observed the teachers teach courses to practical, standard, honors, and AP level students ranging from the tenth to twelfth grades. I observed each teacher during three different classes on two separate occasions for a total of six classroom observations per teacher and twenty-four hours of total classroom observations. For the purpose of my study, I defined verbal, academic teacher feedback as teacher responses to student questions, answers, and comments related to instruction and subject matter. Each instance of feedback observed was placed into one of the following categories: **Positive-** applauds student for response, acknowledges a response is correct, or guides student toward an expanded or more appropriate response; **Neutral-** offers only an acknowledgment of a response (okay, uh-huh); **Negative**- immediately corrects a comment, acknowledges that a response is

incorrect, rejects a response with disapproval, or provides no response to a student comment. The gender of the student involved with each example of teacher feedback was also recorded as well as the total number of male and female students in each class. I recorded student engagement separately for male and female students by counting the number of times students raised their hands or spoke out in class regarding instruction or subject matter. Finally, I recorded classroom field notes to document additional details.

The data collected was tallied by teacher and collectively, and totals and percentages were used to analyze the data. The results report trends in teacher feedback used in the classroom, describe the correlation between teacher feedback and student engagement, and note differences in the amounts and types of feedback received by male and female students.

Results and Conclusions

In answer to the first research question, Graph 1 reflects that positive feedback was used the most often by teachers (55%), followed by neutral feedback (34%), and then negative feedback (11%). In regards to the second research question, teacher feedback was shown to directly affect student engagement. Overall, the more verbal, academic feedback provided by the teacher, the more engaged the students (Graph 2). There was one minor exception to this trend. Although Teacher D had 9 fewer instances of feedback than Teacher B, there were 60 more instances of student engagement in Teacher D's classroom. This discrepancy is small considering that the difference between Teacher B and Teacher D in observed feedback and student engagement when compared to the cumulative classroom totals was only 2% and 6 %, respectively (Chart 1). Because this study only involved 4 teachers and a total of 24 class observations, it is difficult to make generalizations from the results. These preliminary findings call for further research on a larger scale that considers other variables such as class level (practical, regular, honors, AP) and grade level.

Chart 1

Teacher	Feedback	% Total Feedback	Engagement	% Total Engagement
A	275	49%	373	40%
B	82	15%	126	14%
C	128	23%	237	26%
D	73	13%	186	20%
Totals	*558*	*100%*	*922*	*100%*

Graph 1

Graph 2

Total Feedback Distribution

11%

34%   55%

■ Positive ■ Neutral □ Negative

Teacher Feedback and Student Engagement

■ Teacher Feedback
■ Student Engagment
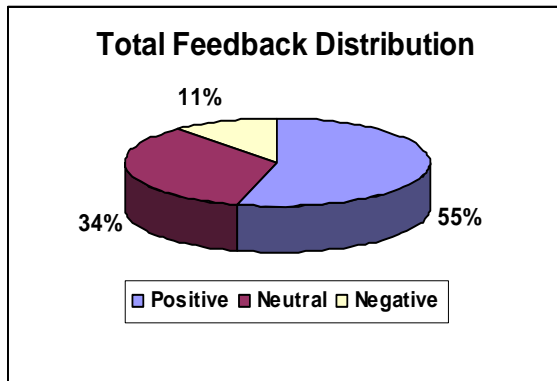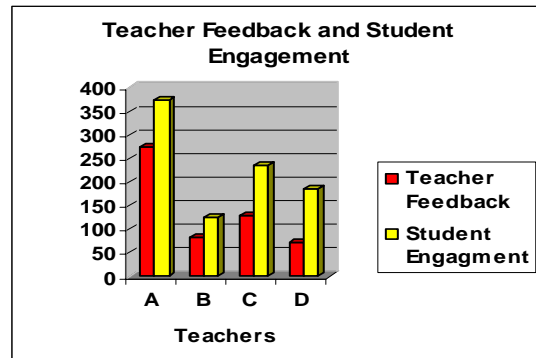
Teachers

The effect of the type of teacher feedback on student engagement is less conclusive. Teacher A, who gave the most feedback and had the most instances of student engagement (Chart 1), used 58% neutral feedback, 37% positive, and 5% negative. Teacher C was second in feedback and student engagement and used 75% positive feedback, 12% neutral, and 13% negative. Teacher B was third in feedback given, had the least instances of student engagement and used 70% positive feedback, 20% neutral, and 10% negative. Teacher D gave the least feedback, was third in student engagement, and used 64% positive feedback, 3% neutral, and 33% negative. From the data collected, no conclusive statement can be made about which type of feedback yields the greatest student engagement. Further research could be done in this area to determine if a correlation does exist. It would be helpful to observe more classes and to consider other variables such as class level, structure of class activities, teacher pedagogy, and teacher-student rapport.

In reference to the effect of student gender on teacher feedback, male students received more overall feedback than girls as well as more of all three types of feedback. When viewed in proportion to their number in the student sample, males received 11% more feedback than girls and displayed 5% more instances of student engagement than their female counterparts (Graph 3). In the individual categories, males received 13% more positive and negative feedback than girls and 5.5% more neutral feedback than girls (Graph 4). These findings suggest that a disparity still exists between the amount and types of feedback each gender receives. A subsequent study could focus on this question on a larger scale and also consider other variables that could impact teacher feedback. It

would be helpful to consider such things as the gender of the teacher and the ratio of boys to girls in each class.

Graph 3

Feedback and Engagement by Gender

Graph 4

Types of Teacher Feedback by Student Gender
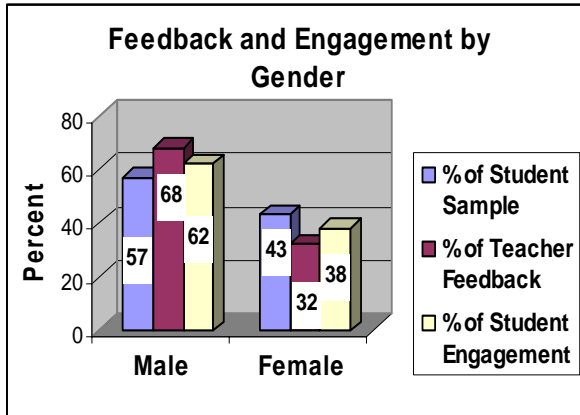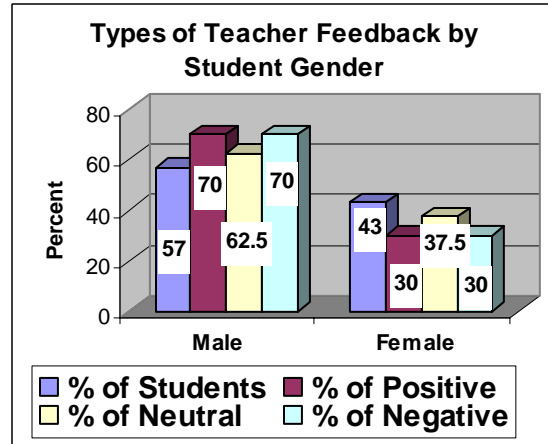
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LOL: The Use of Humor in Secondary Social Studies Classrooms

Stephen Miura

With Raymond Jones, Ph.D.

Wake Forest University
Department of Education
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Introduction

As a lover of a good laugh, I had planned to incorporate humor into my teaching philosophy. I felt that humor was an attention-getting device and thus useful in the classroom. However, after reviewing the literature, I discovered that humor isn't all it's cracked up to be. Kaplan and Pascoe (1970) showed that humorous examples may distract listeners from important information presented in a non-humorous manner. Abbott (2003) found that humor utilized in the classroom by a teacher was unrelated to learning 73 percent of the time. If researchers have found that humor not only hinders learning, but is also unrelated the majority of the time, what provokes a teacher to employ it? Because of this paradox, I wanted to identify the events or situations in the classroom that elicit or trigger the use of humor. In order to further investigate the negative effects of humor such as Kaplan & Pascoe's, I wanted to find out what events take place in the classroom after a teacher employs humor. Another component of my study was to determine if the frequency of humor employed by teachers in regular classes differs from the frequency of humor employed by teachers in advanced classes.

Literature Review

Humor is a nebulous concept difficult to precisely organize and measure. Researchers have identified and organized humor at both the university and secondary level (Abbott, 2003; Bryant, Comisky, & Zillman, 1980; Downs, Javidi, & Nussbaum, 1988; Neuliep, 1991). Downs et al. (1988) asked students enrolled in an introductory methods class at an unidentified school to record and identify humorous portions of an instructor's lectures. Both Abbott (2003) and Neuliep (1991) identified the type and frequency of humor in the secondary classroom. Using a survey, Neuliep was able to derive a twenty-item taxonomy of high school teacher humor. Abbott, taking a more active role in the data collection, observed secondary social studies classrooms, and

created his own taxonomy. Abbott classified the observed humor into eight categories. These studies typify the majority of research regarding the classification and organization of humor. But most available literature that organizes humor in the classroom fails to describe an important component of humor in the classroom: its provocations. One purpose of this study was to identify and organize the immediate triggers or events that precede the instructor's use of humor.

For the most part, researchers have shown that humor is not a beneficial device for learning. Researchers have found that humor does not increase overall retention rates of information presented to an audience (Gruner, 1970; Taylor, 1964; Kaplan & Pascoe, 1977). A study by Kaplan and Pascoe showed that only information presented in a humorous manner during a lecture was retained by students. Terry and Woods (1975) found that humor had a negative effect on the test scores of elementary school children.

Researchers have also sought to determine whether or not there is a relationship between an instructor's characteristics and the frequency of humor he or she uses (Abbott, 2003; Downs et al., 1988; Neuliep, 1991). Researchers have found that males tend to use more humor in their instruction than females (Abbott, 2003; Downs et al., 1988; Neuliep, 1991). Years of experience and whether or not a teacher has received an award have also been examined (Bryant et al., 1979; Neuliep, 1991). While relationships between instructional characteristics and the frequency of humor have been examined, few external characteristics (such as class level) and their relationships to the instructor-employed frequency have been found. My study sought to determine the frequency of instructor humor in social studies differs between regular classes and advanced classes (Honors/Advanced Placement).

Methodology

This study attempted to find the answers to the following questions regarding the use of humor in the classroom:

Q1: What events or situations in the classroom elicit or trigger a high school social studies teacher to employ humor?

Q2: What events or situations immediately follow a high school social studies teacher's employment of humor?

 Q3: Does the frequency of humor employed by teachers in regular classes differ from the frequency of humor in advanced classes?

Q4: Do the triggers and/or the student responses to humor in regular classes differ from the triggers and/ or student responses in advanced classes?

In order to answer these questions regarding the use of humor, I performed an observation study. The participants in this study were six secondary social studies who taught regular level classes and advanced level classes. During each period of observation I recorded teacher employed humor, the immediate classroom events that preceded the humor, and the immediate events that followed the humor. After the data was collected, I categorized the events that preceded and followed humor. This categorization aided me in answering questions one and two. In order to answer questions three and four, I placed all of the data from the regular classes and all of the data from the advanced classes into two separate tables that showed triggers, responses, and frequency in order to determine if there was any difference in them.

Results and Conclusions

I collected my data over a period of four weeks. Because humor is a nebulous phenomenon, I used a humor classification system created by Abbott (2003) to identify humor in the high school classroom. I used a Goldhammer observation tool (McNergney & Carrier, 1981) to collect my data. After carefully analyzing my notes, I was able to place all the events preceding and following humor into distinct categories. I then labeled the categories of events that preceding humor as "triggers of humor," and the categories of events that followed humor as "effects of humor."

The first question of concern in my study related to the events or situations in the classroom that elicit or trigger a high school social studies teacher to employ humor. The triggers of humor are (1.) content explanation; (2.) administrative tasks; (3.) student misbehavior; (4.) student question; (5.) student-off task; (6.) teacher question; (7.) student comment; (8.) student uses humor; (9.) student difficulty; (10.) teacher faux pas; (11.) student complaint; (12.) external disruption; (13.) student response and (14.) unknown. The two most common triggers of humor were content explanation and administrative tasks. Because content explanation and administrative tasks convey information in the form of knowledge and directions, it appears that teachers use humor as a vehicle to convey information to their students.

Question two of my study asked what events or situations immediately follow a high school social studies teacher's employment of humor. Events or situations that follow a high school social studies teacher's employment of humor are (1.) no change or effect in the classroom; (2.) student laughter; (3.) student comments; (4.) student talking; (5.) student mimicking the teacher; (6.) student question; (7.) student joke, and (8.) class quiets down. While humor had no effect or did not change the classroom atmosphere 54.46% of the time, five of the eight categories events that followed the employment of humor are considered not conducive to learning. These events include student laughter, student comments, student talking, student mimicking the teacher, and student jokes.

Question three of my study asked if the frequency of humor employed by teachers in standard classes differs from the frequency of humor in advanced classes. Humor was used 58% more in advanced classes than standard level classes.

Question four of my study asked if the triggers and or student responses to humor in regular classes differ from the triggers and or student responses in advanced classes. Advanced and regular level courses shared five of their top six most common triggers of humor. These shared triggers include content explanation, administrative tasks, student question, teacher question, and student-off task. With the exception of content explanation, which was the top trigger in both class levels, the difference in frequency among shared triggers was less than1 percentage point. The top five most common events that followed humor were the same in advanced level classes and the regular level classes. These events include no change/effect, student comments, talking, laughing, and mimicking the teacher. Events not conducive to learning (student comments, talking, laughter, and mimicking the teacher) followed the use of humor 52.94% of the time in regular level classes and 34.19% of the time in advanced level classes. These statistics illustrate that advanced level classes handle humor with more self-restraint than regular level classes.

My study revealed that four of the five top effects or events that followed humor were ones not conducive to learning. These effects included laughter, student comments, talking, and mimicking the teacher. This finding of humor disrupting the learning process agrees with several research studies. Kaplan and Pascoe (1977) and Terry and Woods

(1975) found that students tested significantly worse when presented material in a humorous manner.

My study revealed events triggered by humor that could negatively affect learning in secondary social studies (laughter, student comments, talking, and mimicking the teacher). However, this study did not involve data related to impacts on learning. A future study could be performed in the secondary social studies classroom that connects these findings to student performance.

This study also revealed that the five top effects or events that followed the use of humor were the same in both regular level classes and advanced level classes. While my study was able to identify the events that followed humor, it was not designed to take into account duration or intensity of the effects. Such factors could possibly shed more light on why teachers use different amounts of humor in different level classes.

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Inspiring High School Readers: Teacher Action and Student Reactions

William Austin Morris

With Joseph Milner, Ph.D.

Wake Forest University
Department of Education
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Introduction

Reading skills and literature are traditional cornerstones of the high school English curriculum. Many high school English teachers, including the researcher, have benefited from a lifetime of avid reading. Steven Rinehart, professor of education at West Virginia University, reports: "Teachers often acknowledge that one of their principal goals is to keep kids reading as a recreational pursuit" (Kuersten, 2002, 6).

However, concerns have recently arisen that today's high school English teachers are doing a poor job of instilling reading skills and a love of literature in their students. Some worry that high school students are reading less (Perie and Moran, 2005, Strauss, 2005), or are reading at increasingly unsatisfactory levels (Kuersten, 2002). In undertaking this research study, I sought to learn what is being done about literature in today's high school English classrooms. Does reading remain a central part of the curriculum? Are our schools making enough of an effort to reach high school readers?

Review of Literature

It is important that high school English teachers work to develop adequate reading skills in all of their students. One way to encourage students to read is to frequently expose them to literature in the classroom. Reading frequently can be enjoyable, can improve reading skill (Kuersten, 2002), and can lead to higher test scores (Gambrell et al, 1996, Perie and Moran, 2005).

The existing body of literature on reading motivation yields the following five tips for encouraging student reading engagement: encourage intrinsic reading motivation whenever possible (Lamme, 2001, Wigfield and Guthrie, 1997), offer students abundant choices in how and what they read (Horner and Shwery, 2002, Jago, 2002, McCombs and

Barton, 1998, Sanacore, 2002, Strauss, 2005), utilize pre-reading and scaffolding activities (Guthrie and Wigfield, 1999, Guthrie et al, 2000, Horner and Shwery, 2002, Kuersten, 2002, McCombs and Barton, 1998, Sanacore, 2002), foster positive rapport and an encouraging classroom environment (Corbett, 2005, Gavelek and Raphael, 1996, McCombs and Barton, 1998), and pay special attention to the reading needs of male and minority students (Corbett, 2005, Wigfield and Guthrie, 1997, Strauss, 2005).

Methodology

Research Questions:

(1) How do four high school English teachers frame and utilize reading in their classrooms?

(2) How do students seem to respond to the instructional methods used in the classrooms of these four teachers?

Four English teachers in a secondary Winston-Salem/Forsyth County School were observed while teaching an assortment of tenth, eleventh, and twelfth grade English courses. Each teacher was observed during ten complete class periods. The researcher noted when and how works of fiction or non-fiction literature were incorporated into the classroom learning environment.

During the last six class periods, the observer recorded (when applicable) (A) the number of hands raised and clear verbal replies in response to the teacher's questions about literature, or in the context of participation in a teacher-led discussion of literature; (B) the number of different students participating in class discussions through verbal comments about literature; and (C) the percentage of student responses involving citations or evidence directly from the literary text(s) being studied.

After observing each of the four teachers ten times, the researcher conducted a private interview with each of the teachers. Teachers were asked a series of questions pertaining to the ways in which they utilize reading in their classrooms. Ultimately, this information allowed the researcher to formulate an ethnographic portrait of the ways in which each of these four English teachers uses written texts in the classroom.

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Results

In the forty class periods observed, literature was the primary focus of 70% of class periods. All four teachers made literature the focus of their classroom the majority of the time. This data should be reassuring to those who fear that literature is a forgotten

Use of Instructional Time

Other 30%

Non-Fiction 8%

Fiction 62%
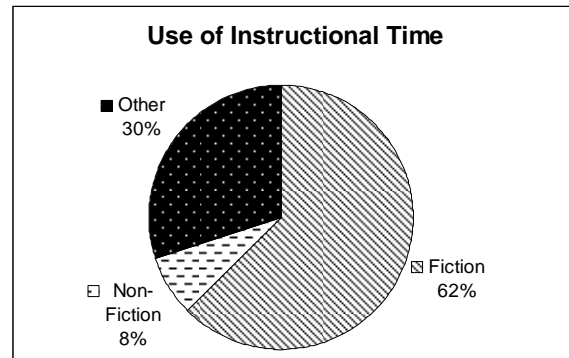
component of high school English classes. When literature was not the primary focus of class, teachers were observed pursuing other important goals: writing, vocabulary, grammar, and critical film study. It was also observed that literature tends to be the main subject of English classes more often as the school year progresses.

It was found that an average of 53.6 % of students in these four classes participated in discussions of literature each day. Fifty-One and a half percent of students' responses contained direct citations or evidence from the texts being studied. Although an average of 46.4% of students did not participate in discussions of literature each class period, those who did choose to voice their opinions spoke an average of 2.9 times per class period. The highest average number of responses per participating student for a single class was 4.7.

Fictional literature received the bulk of instructional time in each class. Teachers were observed employing several different pedagogical styles when teaching fiction. In one classroom, literature was analyzed almost exclusively through an archetypical lens. In another, dramatic readings and performances were often a component of literature study. In all four classrooms, student participation was observed to be highest when literature was connected with students' lives, and when students were able to actively participate in the study of literature. Students seemed to be most engaged when enjoying activities including dramatic performances, uncovering archetypal implications in a work through active discussion, and working actively in groups.

Although all teachers were observed assigning students reading outside of class, some teachers relied much more heavily on in-class reading than others. Free-reading

and choice were limited during the four classrooms observed. When choice was present in the classroom, it tended to be offered in how texts were studied rather than which texts were studied.

All of the teachers surveyed asserted that it is either wholly or partially the teacher's responsibility to instill intrinsic reading motivation in students. Some teachers emphasized their belief in the importance of developing students' reading motivation at a young age. Teachers also report believing in the importance of relating literature to students' own lives.

Conclusions

This study has found that literature is alive and well in the English classroom; if only in the classes of the four teachers who agreed to be observed for the purposes of this study. It has been observed that teachers use a variety of methods to successfully teach literature. However, free-reading and choice are rarely present in the four classrooms observed. It has also been found that teachers assert that it is at least partially the responsibility of teachers to instill intrinsic reading motivation in students.

In the four classrooms observed, an average of 53.6 % of students participated in discussions of literature each day. Only 51.5% of students' responses contained direct citations or evidence from the texts being studied. Although an average of 46.4% of students did not participate in discussions of literature each class period, those who did choose to voice their opinions spoke an average of 2.9 times per class period.

Several major limitations of this study should be noted. The sample for this research was composed of only forty high school English class periods, taught by four different teachers. Observable differences were noted in the teaching styles of the four teachers. Because of the sample size, the results are not intended to be generalized to all English teachers. It is recommended that future research in this area encompass a much larger sample.

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"Look Who's Talking:" Discussion Patterns in Secondary Social Studies Classrooms

LaTosha D. Parker

With Raymond Jones, PhD.

Wake Forest University
Department of Education
December, 2005

Introduction

Social studies curriculum can be described as a tool to develop students into effective citizens, as well as help them to function within a democratic society (North Carolina State Board of Education, 2005). For this reason, developing discussion skills while in public schools will only augment the state's goal of producing effective citizens. According to Larson (1999), teachers consider discussion to be a very effective method of instruction because of the interaction between students and educators. Being skilled in the area of discussion will only enhance a citizen's ability in developing ideas or opinions on certain issues and positions.

Because of the significance of oral stimulation towards enhancing students' capabilities of comprehending historical information, my research and observations examined the role and effects of discussion within the classroom. Discussion included listening skills, using facts to support claims, clearly expressing claims, respecting human dignity in terms of another's thoughts and ideas, and understanding problems or issues (Barber, 1984). Along with discussion, I analyzed the various patterns of student participation embodied in the secondary social studies classroom. In other words, what types of discussion patterns take place in the social studies classroom, and how do they affect student participation?

Review of Literature

Discussion can be seen as a tool to enhance comprehension and understanding within a social studies classroom. Many researchers and educators believe positive outcomes from inter-student discussion of classroom content outweigh the negative.

The academic success of students in social studies classrooms that promote and utilize discussion appropriately is often times better than students' academic success in classrooms that revolve around teacher lecture (Nystrand et al., 1998). Nystrand's et al. study (1998) on the effects of social studies discourse on English writing skills supported the notion that small peer-response groups with discussion improve a student's writing more than the teacher relaying the errors to the student one-on-one.

Social interaction and civic participation are prevalent components of social studies curriculum, and for this reason discourse and social studies are linked (Larson, 1999). Recent studies (Larkin & Pines, 2003; Burchfield & Sappington, 1999) have observed avoidance behavior when a student was called on by his or her teacher to answer a question. Peer pressure in classroom settings and the negative portrayal of students who speak a lot in class decrease the desire for students to become involved. Along with peer pressure, students' cultural backgrounds also affect how they respond to classroom discussion. As Ackley, Colter, Marsh, and Sisco (2003) pointed out in a recent research study, democratic classrooms complete with student discussion increase student achievement which can decrease student drop out rates and increase student retention. It is important to recognize the positive effects discussion has on classrooms and the students who occupy them.

Methodology

The goal of this qualitative research study was to examine the effects of classroom participation and discussion in a social studies classroom and to analyze the various patterns of student participation embodied in the secondary education social studies classroom. Four social studies teachers were observed; the courses included ten Civics and Economics classes, eight United States history classes, and three World History classes. Teacher A was observed twice, teacher B was observed twice, teacher C was observed nine times, and teacher D was observed eight times.

The twenty-one secondary social studies classes were analyzed using the Flanders Interaction Analysis Categories Chart (McNergney & Carrier, 1981). This form of data collection is broken down into four broad categories: Direct Teacher Influence, Indirect Teacher Influence, Student Talk, and Silence/Confusion. This instrument helped me

collect data on student participation and discussion patterns within each classroom. Data was also collected using the meticulously detailed Goldhammer System (McNergney & Carrier, 1981). This system involved recording every action that took place within the classes observed and allowed me to recognize repeated discussion and student participation behaviors within each class.

Data Analysis

The two dominant forms of interaction within the social studies classes as a group consisted of teacher-based lecture and silence/confusion. Approximately 39% of all the social studies class periods consisted of direct teacher influence, which included lecture, giving directions, and asserting authority or criticizing the students. Silence/Confusion, which includes downtime, seatwork, and video watching, among other things, accounted for approximately 35% of the total class time of all the social studies classes. As for student participation and discussion, the data reveals that for approximately 18% of class time interaction concerned direct student discussion or participation. This category includes students' responses to questions posed by the teacher or other students, as well as student initiation of discussion or asking a question without being provoked by the teacher. This data reveals the lack of student discussion within these secondary education social studies classrooms and the dominance of teacher-based lecture as a teaching method.

To understand the discussion patterns better, each academic level (academy, honors, seminar, and Advanced Placement) were individualized so that student-based interaction could be recognized within each ability level. In academy level classes, student talk took up 10% of total class time. In honors level classes, student talk took up approximately 20% of total class time. In seminar level classes, student talk took up approximately 30% of total class time. In AP level classes, student talk took up approximately 12% of total class time. In academy and honors level classes, activities other than student and teacher talk occurred most, approximately 47% of the time in academy level classes and 43% in honors level classes.

Discussion and Implications

Classroom interaction did not include many teacher-based questions, which in return did not promote student participation or discussion. As a result, the secondary education classes observed lacked student-centered discussion, and it became clear that student participation was not the main focus or intention of the classes observed. Even though lecture helps social studies teachers move through material in a rapid manner, the lack of student discussion only hurts the students. Social studies "with its connection to social interaction and civics participation is thought to benefit from classroom discussion" (Larson, 1999, p. 125).

Of the classes observed, student talk accounted for 18% of the total interactions that took place. Student participation and discussion was present, but it was nowhere near the dominant form of interaction within the social studies classrooms. The teachers observed used group work as a means to promote student participation. Teachers need to find a happy medium between lecture and student participation. It is important to increase student discussion within social studies classrooms so the students may form their own personal opinions on the material along with the factual information. The presence of group work and other in-class activities helped promote student participation, but not in proportion to the amount of time students spent listening to their teacher's lecture.

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Practical Ways to Engage United States History Students

Karen Riddle

With Raymond C. Jones, Ph.D.

Wake Forest University
Department of Education
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Introduction

Student engagement is crucial for learning to take place. Students who are bored are likely to be non-engaged. Many students regard the Social Studies as either their most boring or least cognitively challenging class. Yair (2000) found that students in the Social Studies classroom were engaged in class activities only 40% of the total time, and that students rank Social Studies behind only English as the least favorite subject of high school. Other studies have shown that greater engagement both increases academic achievement and also encourages students' positive self-concept, to the point of reducing drop-outs (Brookhart & Durkin, 2003; Finn & Voelkl, 1993). Thus, it is important to discover which teaching methods foster greater engagement in the Social Studies classroom, so that effective methods might be used readily in future classrooms.

Most of the teaching methods utilized in Social Studies are teacher centered, such as lecture, even though previous studies have noted that the most effective engagement strategies involved students more directly and invoked participation (Gehlbach, 2003; Blumenfield & Meece, 1988; Yair, 2000). Unlike past studies, which focused on one type of student, this study sought to determine teaching methods which would effectively engage students across ability levels.

Review of Literature

Research has identified engagement as crucial to achievement and has highlighted trends dealing with student and teacher participation patterns. The following section will define important terms for this research, will discuss general trends found within the research, and will explain contrary evidence. Finally, it will differentiate this research from prior studies.

First, specific terms pertinent to this study should be addressed. Engagement was described both as the child's metacognition of his or her own problem solving abilities, and simply as class participation, whether verbal or behavioral (Johnson, Crosnoe, & Elder, 2001; Blumenfield and Meece, 1988). Boredom was the opposite of engagement or intrinsic motivation (Hunter & Csikszentmihalyi, 2001; Kanevsky & Keighley, 2003). Thus, for the purposes of this study, cognitive engagement is defined as the extent to which verbal student communication is on target in a discussion, since engagement is so hard to quantify.

Several core trends have been found from prior research. First, engagement is critical for learning to take place (Byer, 2001; Hunter & Csikszentmihalyi, 2002; Grenchik, O'Connor, & Postelli, 1999; Johnson, Crosnoe, & Elder, 2001). However, school is often associated with boredom and disengagement, factors related to truancy and temporary drop-out (Ennis, Cothran, Davidson, Loftus, Owens, Swanson, & Hopsicker, 1997; Hunter & Csikszentmihalyi, 2002; Johnson et. al, 2001; Kanevsky & Keighley, 2003). Also, many of the student-centered techniques that have been found to effectively engage, such as class discussion, films, presentations or group work, are rarely used in classrooms (Brookhart & Durkin, 2003; Blumenfield & Meece, 1988; Grenchik et. al, 1999; Klopcic, 1998; Yair, 2000; Townsend, 1993). Yair (2000) found such techniques to be present only 8% of total instructional time in any subject. Although Marks (1995) found "traditional" engagement methods may be more effective than newer, progressive ones, he may have had difficulty expressing his definitive ideas about what engagement's definition was. If prior research has repeatedly shown that student-centered engagement strategies work, then why do teachers not utilize them?

This study differs from previous studies in that it singularly utilizes observation as the data collection strategy. At least four studies used observational criteria, but also included surveys, questionnaires, or interviews (Blumenfield & Meece, 1988; Ennis et. al, 1997; Klopcic, 1998; Townsend, 1993). This study sought to be more objective in nature and to record observable rather than opinion-based data. The narrow scope of prior studies dictates a need for an observation-based study which assesses engagement in order to present an objective view of the frequency and effectiveness of teacher methodologies across ability levels.

Methodology

This research focused primarily on participation patterns in the classroom. Four high school Social Studies teachers and all of their United States History classes were involved in this study. Participants came from a public school system in the Piedmont area of North Carolina. All ability levels were observed. In the targeted school district, US History classes available to high school students are Regular, Honors, and Advanced Placement. This study used observation methods as the only means of data collection. Besides field notes, the researcher employed three separate observation tools: the Flanders system of observation examined teacher-student verbal interaction in the classroom; the Goldhammer system was used to collect narrative descriptions of classrooms; and the Morine system, which can be tailored to fit patterns of phenomena of particular interest, was used to observe non-verbal participation (McNergney & Carrier, 1981). Each class was observed at least six times, with the exception of one class on block scheduling, which was observed the equivalent of eight times. Data was then recorded and analyzed.

Discussion and Implications

Data indicated that teacher-centered activity occurred 71% of total classroom time. Why is this, if research has shown student-centered class activities so successful? Perhaps teachers have poor classroom management skills and feel the need to "micro-manage" their classrooms. Teachers also may feel pressed to cover a large amount of material with limited time. It would be interesting to study Social Studies classrooms that were not bound by an end-of-course exam to see if lecture is also the primary mode of teaching.

This study suggests that presentation of history from multiple points of view creates less overt disengagement. Unlike prior studies, which focused solely on minority students, this study suggests that varying viewpoints will increase overall engagement (Byer, 2001; Johnson et al, 2001; Grenchik et al., 1999)

Educators must be careful where they "see" students. For this particular study, differences between Standard and Honors Level classes lay not in content presentation or

discussion patterns, but rather in expectations of student goals and aspirations. In every Honors level class observed during the data collection period, either the teacher or a guidance counselor discussed college plans with students. Standard level students heard language such as "Make sure you do this assignment so I can pass you," "Do I need to give you a pep talk about graduating from high school again," "Even if you have an F the first quarter, you can raise your grade if you turn in these assignments." One time a teacher asked how many of his standard level kids were planning on attending a college of some sort. Ten of thirty children raised their hands. More disturbing than the lack of expectation within the classroom was the actual ability level for several of the students in Standard and Honors level classrooms. In all of the Standard Level classes, students had difficulty reading from the textbook. In all classes across the board (Standard, Honors, AP), students had difficulty verbally communicating analytical thought. Many more teachers and students must be observed to come to a more complete understanding of this data.

This evidence is disturbing and unacceptable. Students from every ability level should be challenged to learn at or above their zone of proximal development and should be given ideas and opportunities about plans post-high school. Perhaps a reason for disengagement in the Social Studies beyond the typical reasons is that we as educators are not meeting students where they are. How can a student think critically about something he did not comprehend? How can students write if they cannot organize their thoughts? Studies have shown that students are more excited about their subject when they know they can be successful at it (Blumenfield & Meece, 1988). We as teachers need to ensure success.

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Multiple Intelligences in the High School Social Studies Classroom

Wingate Thompson Smith

With Raymond C. Jones, Ed.D.

Wake Forest University
Department of Education
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Introduction: The focus of this study was to determine the ways that Gardner's multiple intelligences are addressed by high school social studies teachers. According to the theory of multiple intelligences, "the mind's problem-solving capacities are multifaceted, exceeding the traditional view of intelligence as being verbally and mathematically bright," meaning that all people have many different forms of intelligence (Campbell & Campbell, 1999, p.5). Harvard University's Howard Gardner, who developed the theory, initially proposed seven different types of intelligences in 1983 before adding an eighth in 1999. Each of these intelligences is possessed by everyone, most can be developed to some extent, they all work together in complex ways, and there are various ways to express aptitude within each intelligence (Gardner, 1983, 1999). The eight intelligences are: Verbal/Linguistic—the use of words, Logical/Mathematical—the use of numbers and reasoning strategies, Spatial—involving pictures and images, Bodily— using the hands and the body, Musical—the use of tones, rhymes, and rhythms, Interpersonal—social understanding, Intrapersonal—self-knowledge, and Naturalist— nature knowledge (Gardner, 1983, 1999).

The theory of multiple intelligences is important in the education field and suggests that teachers be trained to present their lessons in a wide variety of ways using music, cooperative learning, art activities, role play, multimedia, field trips, inner reflection, and much more because students learn in different ways (Hoerr, 2004). According to Gardner (1993), the linguistic and logical-mathematical intelligences are the ones that receive the most attention since we revere those who have the ability to articulate themselves well or show superior logic. However, he would also suggest that we "place equal attention on individuals who show gifts in the other intelligences: the artists, architects, musicians, naturalists, designers, dancers, therapists, entrepreneurs, and

others who enrich the world in which we live" (Armstrong, 1994, p. 8). Because all students possess each of the multiple intelligences and in turn learn in their own, unique ways, it would benefit all students if more than one intelligence was addressed within the classroom setting. Thus, the purpose of this research is to see which of the intelligences are actually being addressed in the typical high school social studies class and the strategies or activities used to do this.

Review of Literature: Understanding the multiple intelligence theory is important for today's educational system. Various research, such as Dunn and Dunn (1999), has shown that every person is unique in the ways in which she learns. Each has her own learning style that appeals to her the most, testing her cognitive skills through her preferred instructional preferences. By understanding this, both teachers and students can now realize that not everyone is going to reach an ideal learning method the same way and that no one uniform style of teaching can reach the masses (Dunn & Dunn, 1999). This understanding, along with the multiple intelligences theory, can have a very positive impact on the current educational system (Gardner, 1999).

Assuming that each student has his own individual needs and learns in a different way from his peers is nothing new to teachers (Diaz-Lefebvre, 2004; Hoerr, 2004). One thing that has been used and has continued to gain public support (Denig, 2004) in dealing with this issue is the attempt to address as many of the multiple intelligences as possible within a given classroom. Additionally, a rise in student achievement by increasing motivation and academic engagement was shown when schools adopted MI beliefs, curriculum designs, and instructional strategies (Campbell & Campbell, 1999; Chen, Krechevsky, & Viens, 1998; Gardner, 1993). Shore (2004) echoes this by saying students "were better able to show what they knew in the course through the use of intelligences" (p.136).

Students also are able to gain a better understanding of the material that they are covering when the multiple intelligences are used in the classroom. Haley (2004) has shown that in foreign language classes, greater success rates in comprehension of the language was found when the MI theory was implemented versus when it was not used. The use of the multiple intelligences also allows students to "grow and to develop their potential as responsible human beings" (Denig, 2004, p.100). Additionally, research has

shown that the use of Multiple Intelligences allows students to have the chance to explore activities and methods of accomplishing a task that they may have never discovered in a more traditional classroom (Shearer, 2004). Shearer found that using the MI theory in the classroom allows for growth in intrapersonal competence and the maximizing of learning so long as both the students and teachers are aware of each student's unique MI profile and then strategies are used to reach these strengths.

Teachers have also have had a positive impact from using the multiple intelligences in their classrooms (Gardner, 1999). Gardner says his theory challenges educators to find "ways that will work for this student learning this topic'' (p. 154) which is basically suggesting learner-centered philosophy. Campbell and Campbell (1999) also found that the application of MI theory leads to gains in state assessments and standardized tests at the K–12 level, lowers the achievement gap between white and minority students, and leads children to outperform their district, county, and national peers in basic skills. Haley (2004) has also found that the MI theory has enhanced teachers' classroom management skills. Ultimately, McCahill (1994) would argue that the use of the multiple intelligences promotes professional growth through requiring teachers to look at all aspects of learning in all aspects of the curriculum while reflecting on what the students respond to the best.

Methodology: All data collection came directly from classroom observations. Four separate teachers were observed a total of five times apiece, spread out over the course of a month and a half. All were high school social studies classes within a moderate sized school system in the Southeast. Convenience sampling was used; as teacher volunteers served as the study participants. Within each observation, a checklist created by the Simcoe District School Board of Ontario, Canada, which lists each of the eight multiple intelligences and has various activities or curricular strategies under each heading that would challenge this area of intelligence, was used. Each time one of these strategies was used by the teacher, a tally mark was put on the checklist. At the end of each teacher's observation period, all the marks were added together and analyzed and which intelligences were addressed the most and what activities were used to do so was determined. Ultimately, all four of the classrooms were examined to see if there were any similarities or common themes within the typical social studies classroom.

Results and Conclusions: Since the primary question for this study was to see which of the Multiple Intelligences are addressed the most within the typical high school social studies classroom, the data was first analyzed by going through the twenty checklists and charting which of the activities was considered a substantial activity (one that was important in the overall lesson and required significant engagement from the students), what intelligence it addressed, and how many times these substantial activities were used in the classroom. When doing this, it was found that the Linguistic Intelligence was addressed forty-two percent of the time, two times more than any of the other intelligences, with Interpersonal being addressed 18% of the time. There was not a single class period that did not address at least four of the intelligences overall and at least four substantial activities were used in every class to do this. However, other than the Linguistic intelligence, only the Kinesthetic was addressed in every class. Also of importance, it was noted that the Naturalistic Intelligence was not addressed a single time.

The secondary question of which activities are used to address the intelligences was also explored. Again, by looking at the twenty different checklists, it was discovered that a total of forty-five different activities were used within the class periods observed. Listening (Linguistic Intelligence) and speaking/lecturing (Linguistic) were used in every single period and discussion/questioning (Interpersonal) was used in all but one, while body language (Kinesthetic) was used in eighteen of the twenty class periods. However, the data still showed that of the two hundred fifty-eight total activities, thirty-four percent addressed the Linguistic Intelligence and twenty-one percent addressed the Spatial, showing that the Linguistic Intelligence was most often addressed within the classroom. Ultimately though, more parity was shown when viewing the overall activities and what Intelligence's they address than when looking at the substantial activities and what Intelligences they address.

According to Denig (2004), attempting to reach as many intelligences as possible within a given class is ideal. As the field notes show, at least four of the eight were addressed in every class observed. This is ideal in that not just one intelligence was addressed and teachers did do their part by incorporating at least half of the total intelligences every time. However, the Naturalistic Intelligence was never used and this

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would suggest a disservice to those students who have this as their top intelligence. Each of the four teachers who were observed developed a theme in that they typically did the same thing and used the same activities from class to class. They all addressed at least four of the intelligences, but they all seemed to use the same activities to do this. However, there was little variation, unlike what McCahill (1994) and Hoerr (2004) seem to call for. Every class observed used at least six different MI activities (as indicated on the checklist) that addressed at least one of the intelligences while one class went so far as to include twenty-five different activities while the students worked on group projects and presentations.

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A Study on the Effectiveness of Writing Across the Curriculum

Beth Stapperfenne

With Robert Evans, Ph.D.

Wake Forest University
Department of Education
December, 2005

Introduction

In many classrooms across America you will find students writing. Their hands move across a page to copy down notes from a whiteboard or book, fill in blanks or answer questions with short sentences. Students are already writing a lot. However, it is not necessarily the amount of writing which is the goal for students who are participating in Writing Across the Curriculum (WAC), but rather the types of writing students are producing.

Review of Literature

At an urban college, Lester (2003) collected all writings that 78 college students completed in their classes. After examining the students' writings, Lester found that 73% of it required "little of students other than writing down the words of someone else…or filling in the answers to someone else's questions." So students are often expected to regurgitate the information that the teachers give them instead of critically and creatively thinking about the content. Students are no longer being asked to perform on the higher levels of Bloom's taxonomy (Bloom, 1956), analysis, synthesis, and evaluation, but instead are performing on the lower levels of knowledge, comprehension, and application (DeNight, 1992).

Therefore, one of WAC's goals is to change the types of writing students complete in class. If students critically and creatively think about the ideas presented in class, they may learn more richly about the content than if they had just memorized copied notes (Elmborg, 2003). After all, research shows when a student is engaged in the content, then learning comes more readily, and students tend to be more engaged during writing assignments (Langer and Applebee, 1987). Through writing assignments aimed at critical thinking and creativity, students will at least master the content they are supposed to learn and at best will learn to analyze it and incorporate their own ideas.

Many studies have produced conflicting evidence. When Butler (2001) used short writing exercises after lecture in his two sections of introduction to psychology (n=204) at a university, he found that the students who participated in the exercises did better on their exams. However, some studies present negative results. No significant difference in student achievement were found when 177 ninth graders in an Introduction to Agriculture and Natural Resources class participated in a study examining the effectiveness of short expressive writing assignments versus lecture and discussion (Reaves, Flowers, and Jewell, 1993). The theories behind Writing Across the Curriculum seem sound, but unfortunately, it is not known for certain if writing to learn actually improves student performance.

WAC claims that writing on a higher level of Bloom's taxonomy and using more creative writing will improve student performance. This study seeks to find out if it is the type of writing that the students are involved in which improves learning or simply the effect from the students being exposed to the information again.

Methodology

Two honors high school biology classes and one regular biology class from two different teachers were recruited to participate in this study. Each class was split relatively in half with half the class doing worksheets and the other half doing writing assignments every time.

The teachers used their usual teaching methods during the class period except for leaving about 15 minutes at the end of the period open. During this time everyday the teachers passed out either the writing assignment or worksheet to the students. At the end of the series of lessons on cells, the teachers gave students their usual tests. Teachers attached a survey to the back of only half of the students' tests because only the students who completed the writing assignments during the study completed the surveys.

The overarching topic uniting the writing assignments and worksheets was cells: prokaryotes and eukaryotes and plant and animal cells. They were both constructed to take around 15 minutes, have clear directions, and cover the topics satisfactorily. The writing prompts were constructed so students would have to write more than a few sentences and were above the knowledge and comprehension level of Bloom's Taxonomy. This was important because it is theorized that the higher the level of

Bloom's Taxonomy of an assignment the more critical thinking there is required of a student. The worksheets had activities such as matching, multiple choice, and crossword puzzles and were aimed at the lower levels of Bloom's taxonomy, knowledge and comprehension.

Through the worksheets, students who did not participate in the writing assignments would have equal exposure to the material. This was important because the researcher wanted to ensure that the reason for any significance in student learning was not due simply to greater exposure. It was therefore necessary that the worksheets and the writing assignments covered relatively the same material. However, the worksheets, while requiring the students to work with the content, did not require them to write very much, to write creatively, nor to think as deeply as the writing assignments required.

The Likert style survey was designed to allow students to inform the researcher of the difficulty of the prompts, if they were engaging and if they were perceived as helping the students learn more. Whether or not there was a statistical difference between the writing assignments and worksheets, there could be value in the prompts if students perceived the assignments as valuable and engaging.

The test scores used in this study were from the usual chapter test given by the teachers after they have completed the study of cells and a quarter test. One of the teachers made the chapter test, which was used by all the classes. Also, students took a quarter test two weeks before the study began. This test was a standardized test that all biology students in this county took after the first nine weeks of classes.

Results and Conclusions

In the analysis of the chapter test scores, only the questions which pertained to the writing assignments and worksheets were examined. The scores on the pertinent test questions for students who completed the writing assignments and for those who completed worksheets were all averaged together. The results were graphed in Figure 1.
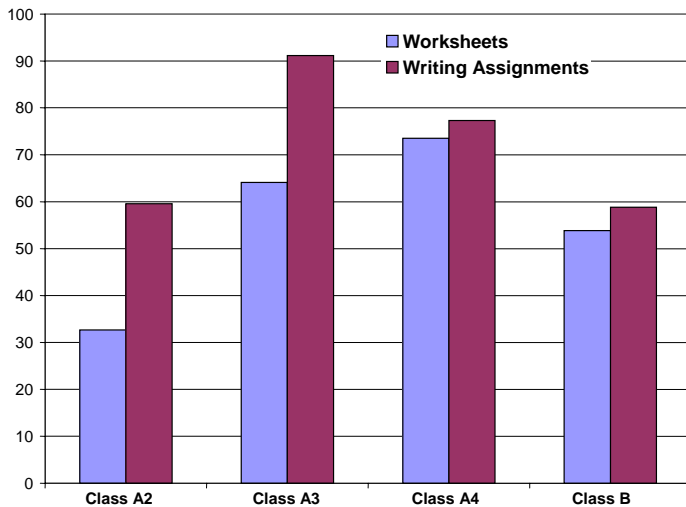
Figure 1. Test averages for students

ANCOVAs were run on the data to see if there were significant differences in the means of the test scores for the students who completed worksheets and the students who completed writing assignments. These were the same means in Figure 1. The quarter test scores were used as the covariate.

Writing assignments, which are creative and on a higher level of Bloom's taxonomy, do not appear to have a greater impact on student scores than worksheets, which are not creative and on a lower level of Bloom's taxonomy. Therefore, the findings of some studies which found that students performed better on tests, after participating in writing exercises opposed to other types of assignments, were not corroborated by the results of this study (Butler, 2001). The claims of WAC theorists that creative, higher level, and student-centered writing engages students more and uses specific processes, which all lead to better learning, when compared to other learning methods have, not been substantiated by this study's results (Langer and Applebee, 1987). This study, instead, found there may be other methods, in this case worksheets, which results in the same amount of students learning as WAC assignments. This outcome supports previous research findings (Reaves, Flowers, and Jewell, 1993).

The overall results for the means of the survey questions found that students had a mostly neutral opinion about the writing assignments. This does not support the WAC theorists who claim that writing prompts, which require critically thought out and creative responses, results in student engagement (Langer and Applebee, 1987). It also appears that overall, students thought the writing assignments were neither too difficult nor too easy which helps support the materials design in this study.

This study originally began with four biology classes for a total of 143 students. However, only the test scores for the students who had completed all four worksheets or

writing assignments and taken the quarter test could be used. The data set therefore encompassed the scores of 56 students, which is a small sample size. The attitude survey also had a relatively small sample size, n=26 students.

Unfortunately, one of the teachers had to have their students complete three writing assignments or three worksheets in one class session. Because the writing assignments are designed to require quite a bit of creativity and critical thinking, completing three of the assignments in one session could have greatly hindered students' performances on the assignments and the power the assignments could have had on student learning.

In all of the classes, the mean scores on the tests for those who completed writing assignments were higher than for those who completed worksheets. Even though these differences were not significantly different, this does show a positive trend towards the writing assignments. So, if the limitations in this study could be minimized, a follow-up study using the same treatment might show more significant differences in the means.

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The Effect of Science Fiction Media Clips
on Science Attitudes and Achievement

Bradley Stephenson

With Robert Evans, Ph.D.

Wake Forest University
Department of Education
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Introduction

Movies, books, television, and radio have shown how science fiction has become a pop-culture phenomenon in the last century in the United States and around the world. As such, sci-fi may be a potent force that can be utilized by educators to engage students' imaginations and foster a more vibrant, appealing, and creative learning environment. Sci-fi has is being used to teach environmental education, politics, literature, anthropology, ethics, physics, culture, and other disciplines, but it lacks an impressive pedigree of practical research in the classroom. To what degree does it foster intrinsic motivation in students? How might it affect student attitudes towards school in general, and to science in particular? Can it actually enhance performance as well as motivate? These questions need to be addressed by further research. It is the purpose of this study to describe the effects of using science fiction media clips in the science classroom on students' attitudes towards science and achievement in science.

Review of Literature

Much current research maintains that motivation is connected with student performance in the classroom (Berry & Plecha, 1999; Dembo, 2000; McCombs, 1996). These studies and others demonstrate that highly motivated students, particularly those who are intrinsically motivated, generally perform better than less motivated students. Attitude and motivation are affective variables that have been shown to have a strong positive influence on student achievement (Hammouri, 2004). Research is thus showing that it may be important for educators to tap into motivation and student attitudes to maximize performance.

Other studies show the value of intrinsic motivation over extrinsic motivation. Lepper, Corpus and Iyengar (2005) studied a large, ethnically diverse sample of third through eighth graders and found intrinsic motivation proved positively correlated with children's grades and standardized test scores at all grade levels, while extrinsic motivation showed few differences across grade levels and proved negatively correlated with academic outcomes.

Lepper & Cordova (1992) examined the effects of two or more versions of an educational activity, each designed to involve identical instructional content, but differing in motivational appeal. The data from the studies provided support for the hypothesized cognitive and motivational benefits of appropriately designed motivational components of educational activities. Thus, there seem to be many educational benefits when students are intrinsically motivated by engaging instructional activities.

Research indicates that presenting material in a dramatic format, such as popular media can create, improves learning, understanding, and detail retention (Marzano, Pickering, & Pollock, 2001). Studies are also showing that bringing fun to the educational environment increases learning, retention, and subsequent interest in the subject matter (Lepper & Cordova, 1992).

Martin-Diaz, Pizarro, Bacas, Garcia, and Perera (1992) have proposed a critical analysis of science fiction as a motivational enhancement for students to be strategically engaged in the learning of scientific concepts. This particular investigation used a sci-fi short story, "Maelstrom II" by Arthur C. Clarke. Their results were promising, and suggested further research into the use of science fiction as a motivational tool. Such motivational tactics are being shown to increase intrinsic motivation in students to succeed. As such, science fiction may be a potent force for science teachers to use to motivate their students and possibly improve attitudes and achievement.

Methodology

This study set out to determine the effects of using brief science fiction film clips as engagement tools in the science classroom on student achievement and attitude towards science. Two regular physical science classes from a large urban and suburban high school in northwest North Carolina were selected, both having the same teacher.

Both classes received identical instruction from the teacher, except that while the control class used typical engagement methods, the experimental class used brief science fiction movie clips as engagement tools.

The subjects in the sample, as well as the school, were extremely diverse and had a white student population that was in the minority. A prior test average was calculated for each student against which their post-test scores could be compared. These averages were from the four previous tests created by this teacher in this class.

After returning student assent forms and parental consent forms, each student was given an Attitude Towards Science Inventory (ATSI) to complete. This 33 question Likert-style survey assess attitudes towards science along four separate substrata: enjoyment of science, perceived usefulness of science to society, anxiety towards science, and self-concept in science.

During the treatment period of about two weeks, the control group received normal instruction from the teacher using normal engagement methods. The experimental group received identical instruction and content from the teacher, with the exception that they were shown brief science fiction media clips as engagement tactics in place of more traditional engagement tactics. Four film clips were shown in all, one every three days. The clips came from the films *Jurassic Park*, *Back to the Future*, and *Apollo 13*. The study design did not include any discussion regarding the clips, however any discussion between the students and teacher was not squelched since it arose organically from interaction with the treatment.

Following the treatment period, each student took a teacher generated test assessing the material learned during the unit, which in this case was electricity. The scores on this test were compared to their previous test averages using an ANCOVA to assess any differences that arose following the treatment.

Also, each student was again administered the ATSI to gauge their attitudes following the treatment. These data were compared with the earlier ATSI scores using a factorial ANOVA to assess any differences in attitudes following the treatment. Attached to the ATSI at the end of the treatment was a set of four (control) or five (experimental) open-ended questions for a more qualitative analysis of the students' interaction with the treatment.

Results and Discussion

For the ATSI survey data, the main effects of gender, class type (control or experimental), and survey type (pre or post) had no statistically significant differences in any of the five types of scores: total, usefulness, enjoyment, self-concept, or anxiety. The interaction effects of class and survey type, gender and survey type, and class and gender and survey type, also had no statistically significant differences in any of the five types of scores. The interaction effect of class and gender was significant at the alpha = 0.05 level for anxiety score, enjoyment score, usefulness score, and total score; but it was not significant for self-concept score. While these significances are interesting findings regarding the samples, they are not correlated with the treatment and reflect the previous conditions of the groups external to the treatment, and as such are beyond the scope of this study.
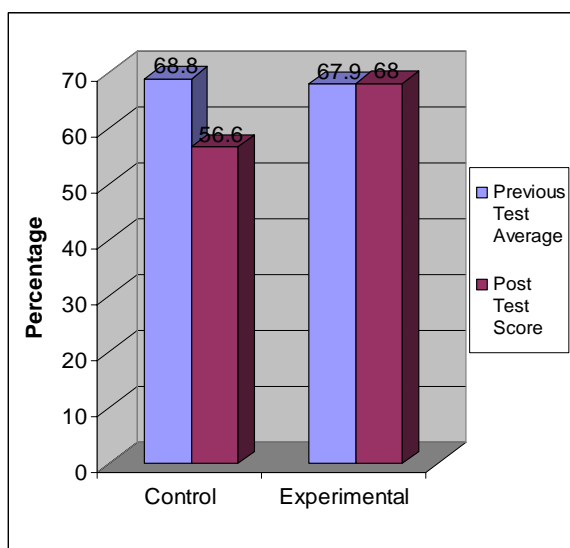

Figure 1. Test Data Analysis

The findings for the test data are summarized in Figure 1. The previous test averages of the two groups were not significantly different (t=0.366, sig=0.716). When the post-test scores were compared, covarying for the prior test average, the differences found were significant (F=12.056, sig=0.001). The experimental group scored an average of 68.0 on the post test, which was 11.3 percentage points higher than the control group which scored 56.6 on the post test.

The qualitative data from the open ended questions indicates that most students that perceive science as fun do so because of the hands-on nature of the labs and activities. Students who do not see science as important to their lives do not seem to associate their interests or their jobs with science.

While this study shows promising results supporting the benefits of using science fiction media clips in the classroom, more research is needed. The researcher suggests that further studies be refined to include larger samples over longer periods of time, and

that the media clips be intentionally integrated into the curriculum through discussion or other application.

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The Use of Portfolio Assessment in the K-12 Spanish Classroom

Amy Talley

With Mary Lynn Redmond, Ed. D.

Wake Forest University
Department of Education
December, 2005

INTRODUCTION

Currently, much attention in K-12 education is focused on high academic standards and accountability of student progress. Under the federal legislation, *No Child Left Behind*, all students in elementary and middle school are assessed annually in reading and math, while high school students are assessed in core subject areas. However, although foreign languages are considered core subjects, they are not currently tested under *No Child Left Behind*; hence, less importance is given to foreign language study in a student's academic career. In order for students to attain a high level of proficiency in a foreign language and to be prepared to meet the challenges of today's global marketplace, it is necessary to provide sequential language study in grades K-12 that is both performance-based and standards-based (Curtain & Dahlberg, 2004).

REVIEW OF LITERATURE

In the field of foreign language education, the standards movement has highlighted the need for more effective K-12 sequential foreign language programs that help students attain a high level of communicative competence in at least one foreign language upon completion of their program of study (ACTFL, 1996). The *Standards for Foreign Language Learning* (ACTFL, 1996) and the *ACTFL Performance Guidelines for K-12 Learners* (ACTFL, 1998) are national initiatives that focus on the development of students' language proficiency. They were designed by the foreign language profession to provide the content knowledge that foreign language students should possess and a proficiency gauge by which to measure the development of this knowledge. Currently, there are no federal mandates on foreign language program design and implementation; therefore, states have the freedom to use the national standards as they see appropriate in designing their own foreign language curricula and assessment practices. At present,

foreign language programs vary greatly between states and school districts, and very few districts in the United States offer sequential K-12 language programs. Because of the inconsistency in approaches to foreign language study, assessment of student progress is a critical concern (Ezarik, 2004). There are several external assessment instruments available to school districts to measure students' language development in grades K-12, such as the Student Oral Proficiency Assessment (SOPA) and the Early Language Listening and Oral Performance Assessment (ELLOPA), but it is up to each state to determine how assessment will be implemented as well as funding resources to support it (CAL, 1991; CAL, 2000-2001).

In addition to external assessments, it is the foreign language teachers' responsibility to incorporate on-going assessment practices that measure multiple aspects of language development and that are both standards-based and performance-based into their daily instruction (Shohamy, 1992). The current approach to foreign language assessment emphasizes providing multiple opportunities for students to show what they have learned and what they can do using the foreign language (Shrum & Glisan, 2005). Research shows that a varied assortment of assessment types, combining traditional testing methods with ongoing performance assessment, is beneficial for foreign language students in many ways (Choi & Samimy, 2002). A language learner's ability to demonstrate knowledge and comprehension is greatly affected by the method used for assessment; therefore, in order to accurately evaluate student progress, teachers need a wide variety of work samples and evidences on which to base their evaluation. Balanced assessment gives a broader picture of language development, and provides opportunities for success to students that may struggle with traditional assessment types.

One assessment method that is currently being used in the foreign language classroom to measure student progress is portfolio assessment. Portfolios are systematic collections of student work samples, student reflections, peer and self-assessments, and teacher assessments that are focused on specific learning goals (O'Malley & Valdez Pierce, 1996). Many foreign language teachers use this assessment type in their classes because portfolios provide a direct link with instructional practices and supply diagnostic feedback on student strengths and weaknesses (O'Malley & Valdez Pierce, 1996). Shrum and Glisan (2005) assert that portfolio assessment empowers students and allows

them to get actively involved in the process of learning and assessment. Through well-developed portfolio assessments, students can learn how to accurately self-assess and how to evaluate their peers. A portfolio's focus on student reflection and inquiry can increase students' ownership of the learning process and allows them to think about and discover more about the ways in which they learn. Portfolios provide valuable information for teachers on how and when to make instructional modifications which can be used to monitor teaching and program effectiveness. The purpose of this study is to determine: 1) if K-12 Spanish teachers are currently using portfolio assessment or components of this assessment practice in their Spanish classes and 2) how portfolios are designed to support Spanish language development.

METHODOLOGY

The participants in this research study consisted of 18 Spanish teachers from a public school district in North Carolina: six elementary school teachers, six middle school teachers, and six high school teachers. The teachers were selected through recommendations from the advisor and/or the school district foreign language coordinator, as well as through the teachers' willingness to participate. The study was conducted in two parts. First, the researcher interviewed each participating teacher using an interview instrument designed by the researcher to investigate the assessment practices in the K-12 Spanish program. Then, the researcher observed one class of each participating teacher, looking for similarities and differences between teacher interview responses and the data gathered through class observations.

RESULTS AND CONCLUSIONS

The information collected during the interviews and observations was analyzed with regard to the teachers' philosophies toward the role of assessment in foreign language, their incorporation of various assessment types, and the effect of assessment on student learning. The following results come from this analysis.

In order to develop student proficiency, it is essential that teachers use the target language to frame and carry out instruction. During the researcher's class observations, the researcher found that all six elementary Spanish teachers used the target language for the majority, if not all of the class time. The six middle school teachers used both

English and Spanish during instruction, relying mainly on English, and the high school teachers varied in their use of the target language.

When teachers were asked about their expectations with regard to proficiency development and communication ability, elementary teachers responded that they were concerned with: exposure to the language and culture (4), the development of listening comprehension and basic communication (4), as well as the development of a positive attitude toward foreign language learning in their students (3). All six middle school teachers responded that they were concerned with their students being able to use the language in oral and written form. The high school teachers responded that they expected their students to: communicate orally and in writing (5), listen for key words (4), and take risks in using their Spanish language skills (4).

Seventeen teachers (elementary, middle, and high) agreed that one of the most important purposes of assessment is to provide feedback to teachers on whether to re-teach or to move on to new material. Seventeen teachers indicated that the school district is in the beginning stages of developing an assessment plan, and thirteen mentioned district-wide 5th and 8th grade Spanish assessments. However, due to the recent introduction of these assessments, teachers were unclear about the purpose of these assessments and how to use the results derived from them. There is no district-wide high school assessment plan, and each teacher is responsible for assessing his/her students' language proficiency.

The assessment types that teachers design and use in their classes vary greatly depending on grade level. The researcher found that elementary Spanish teachers focus more on oral language development measured mainly through informal assessment types, such as informal observation during class (6). Middle school teachers focus on both oral and written language development, incorporating a combination of formal and informal assessment types, such as class worksheets (6) and performance assessments (6). The high school teachers' focus is more centered on formal, written assessments (6), as well as on creative student use of oral language through skits and presentations (6).

Although the teachers at each level use a wide variety of communicative activities to assess their students' language proficiency that would fit nicely into portfolios designed for assessment, 13 of the participating teachers (72 % of participants) do not

currently use portfolio assessment in their Spanish classes. Two teachers are not familiar

with it, and 12 have not received training on how to incorporate this assessment type into

their instruction. Teachers indicated that several factors deter them from using portfolio

assessment: high number of students, limited space, lack of time for planning and

assessment design.

In conclusion, the researcher found that the school district is making progress

toward creating an articulated K-12 Spanish program with district-wide formal

assessments to measure student proficiency development. However, the results of this

study revealed several possible ways to further increase the effectiveness of the district's

foreign language program. The district is in need of a clearly delineated, proficiency-

oriented foreign language plan. With a carefully-articulated foreign language program

design, teachers from each grade level would have clear language objectives, which

would guide them in planning proficiency-oriented instructional strategies and

assessment practices that transition between grade levels. A more tightly articulated

program may encourage a greater number of students to continue the study of the

language offered in elementary school throughout high school. With the design and

implementation of such a proficiency-oriented language plan, portfolio assessment would

be a beneficial option for the district. It would strengthen and support the assessment

plan by showing multiple representations of language development in grades K-12, thus

benefiting the program, teachers, and students in successful language outcomes.

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Diverse Literature, Diverse Voices: Do They Go Hand in Hand?

Katherine Thompson

With Joseph Milner, Ph.D.

Wake Forest University
Department of Education
December, 2005

Introduction

My research questions in this study are: What is the effect of studying traditional and multicultural texts on white and nonwhite student participation? Does the type of text impact the amount and the scope of the contributions of students during discussion? I researched the amount and depth of participation by white and nonwhite students when studying traditional and multicultural texts, to determine differences between groups.

Review of Literature

In English classrooms, multicultural literature is being used to encourage intercultural understanding and to reflect the diversity in the classroom. Is multicultural literature working as the equalizer that educators and policymakers hope for? And what *is* it? The most appropriate definition I found is proposed by the teacher in focus in Dressel's study (2005). She claims it "reflects a power differential between groups created by such things as ethnicity, race, gender, or economics" (p. 754).

But why is multicultural literature actually important? Understanding other cultures is an integral part of reflection upon one's own cultural background, and therefore a path to learning more about oneself (Dong, 2005). Glazier and Seo (2005) agree, stating that, at its best, multicultural literature "can provide both a window and a mirror" for students—a window into other worlds, and a mirror reflecting oneself (p. 1).

There can be palpable resistance among majority students to the study of multicultural literature. They may be uncomfortable discussing racism, oppression, or their own privilege (Beach, 1997, p. 69; Chizhik & Chizhik, 2005; Glazier & Seo, 2005). Multicultural literature can be as essential as traditional literature, but only if all students—minority and majority—are involved in the dialogue.

Methodology

I observed four 10th-12th grade English teachers' classrooms ten times each, at a typical semi-urban high school in North Carolina. When they were studying literature I observed the levels of participation among white and nonwhite (black or Latino) students, tallying the number of contributions made by students of each group. In addition to counting the contributions made by each group, I classified the scope of those responses, labeling them "textual responses" and "personal responses." Textual responses related to the text being discussed or to its connection with other texts studied. Personal responses related the text being discussed to the student's own thoughts, feelings, and experiences. I divided my results according to what type of text was being studied: majority-culture texts (for example, Milton's *Paradise Lost*), and non-majority-culture texts (for example, *Beloved* by Toni Morrison). I also included texts by white authors that included cultural themes, such as Harper Lee's *To Kill a Mockingbird*, with the non-majority-culture category. During discussion, I kept track of the race of the student speaking and the type of response he or she made. To analyze my data, I tallied my results for each applicable class period (in only 14 out of the 40 periods observed was literature discussed, and those in only 3 out of 4 teachers' classrooms), and obtained the totals for all observed sessions, noting the type of text studied, proportion of minority to majority students present, and the average comments per student. I used this proportion to analyze whether another participation factor: whether minorities participate more often when they are surrounded by other minorities than they would otherwise. I looked at the total average comments per student, as well as that figure broken down by type of response and type of text studied, to see if there was any disparity between the participation of either group when studying one type of text or another (majority-culture or non-majority-culture).

Results and Discussion

I was surprised by two elements of literature study in these classrooms: its relative infrequency (only half of the observed sessions), and a great deal of in-class reading, rather than discussion of texts read as homework. Much of the observation data I will analyze is from "discussions" concurrent with the reading-aloud of the text by teacher and students. The texts themselves deserve mention as well. Recall that I used as my working definition of "multicultural literature" a text "which reflect[s] a power differential between groups created by such things as ethnicity, race, gender, or

economics" (Dressel 2005, p. 754). This principle guided me in classifying texts such as Conrad's *Heart of Darkness* and Wiesel's *Night*. Although these are staples of the English classroom written by white authors, both writers are from a culture very different than that of the students, and, more importantly, address the "power differential"—Conrad treats colonialism and the power differential European colonists created in Africa, and Wiesel deals with the Nazis and their Jewish victims—both focus on this privilege-and-oppression dynamic, so I classified them as "multicultural." Due to this difficulty of classification, I did end up re-naming my terms to be more inclusive of my decisions, ultimately calling the categories "majority-culture" and "non-majority-culture" texts.

I examined the types of comments minority and majority students made to both majority-culture and non-majority-culture texts, to see whether white student participation declined (particularly in the area of personal responses) when studying works not from the majority culture. Also, I wanted to examine whether minority students were responding more and more personally to texts that did not deal with majority culture, as most would expect. My results are below in Figure 1.

As you can see, some of the results are as predicted, and others are surprising.

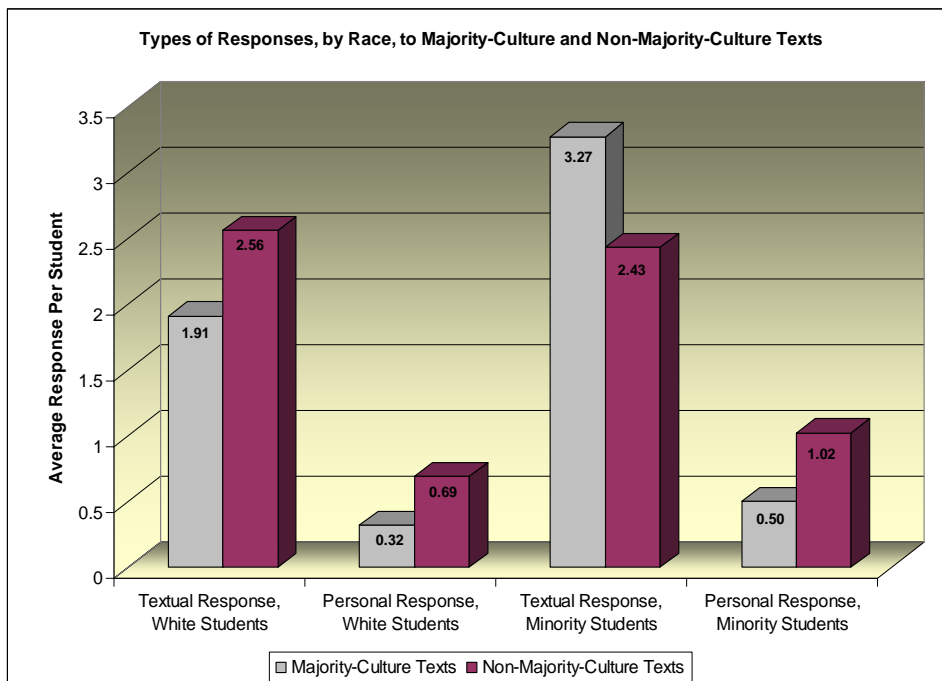**Figure 1.**

Note: Average Response Per Student was calculated by dividing the number of responses of that type (textual/personal) and race (minority/white) over the number of students of that race present.

Rather than decrease their contributions, white students' responses increased markedly with the non-majority texts, a one third increase in their textual responses and a 100% increase in their

personal responses. However, minority students actually decreased their textual responses with non-majority texts, but, as anticipated (and as the white students did as well), their personal responses doubled. Aside from the aberrant category of minority textual responses, each category showed an increase in response, regardless of race, and particularly in personal response, when studying non-majority-culture texts.

To look further, I turn to an examination of the teachers. Two teaching acts stand out as most important to me: the kinds of questions asked and the way responses are solicited. Teacher A's students provided more personal responses due to the questions she asked them—"how would you feel if…" and "imagine that you…." I noticed, across all classes, that very few students would volunteer a personal connection to the text without being asked. But when Teacher A asked, her students told. One student's personal connection was often the stimulus for other students to put in their two cents. Teacher A also seemed to have more students participating, due to soliciting responses and structuring talk in a round-robin fashion that required each student to contribute. Teachers B and C more often relied on students to volunteer, either with raised hands or just calling out—responses were accepted from anyone who volunteered, but this was often the same few students who were the most confident or talkative (regardless of race).

One other factor is important in determining the participation of a given racial group: the presence of others of that racial group. It has been observed that mixed-gender classrooms present obstacles to female participation (Sadker & Sadker, 1995), and I would expect the principle (of feeling more comfortable participating if surrounded by others like you) to apply to the case of racial minorities. For this reason, I charted the average number of responses as a function of the concentration of minorities in the classroom (Figure 2). While the data points are quite "scattered," the trend lines show their overall motion: as minority concentration increases, number of responses per minority student increases. White student responses decrease as the concentration of minorities grows, but the effect is not as negative for them as it is positive for the minority students. The lesson for teachers: be cognizant of which group is a minority in the class, since those students need more urging than those who have safety in numbers.
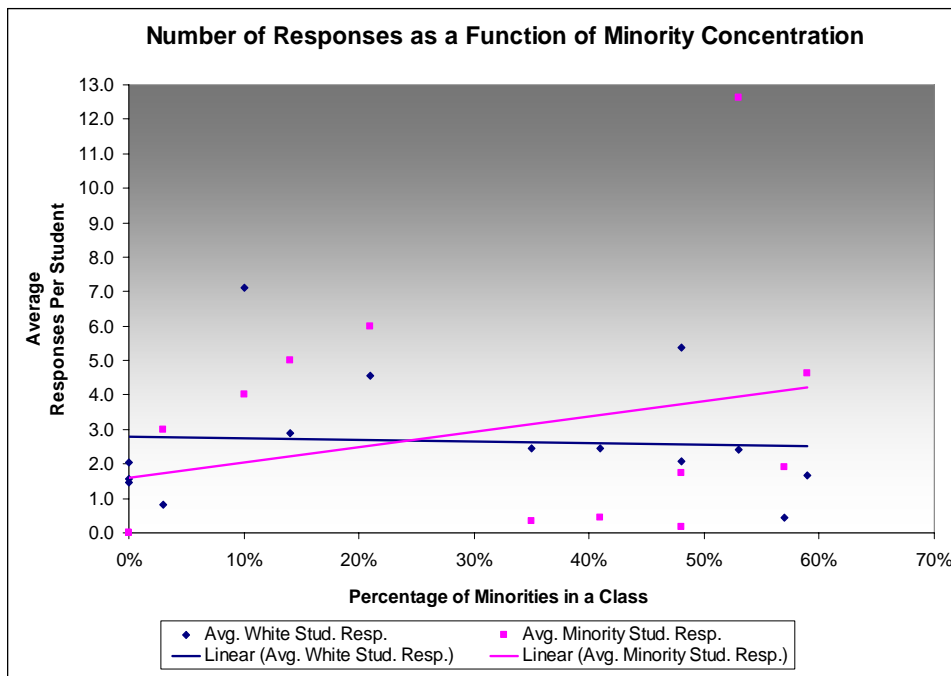
Figure 2: Average responses per student (separated by white and minority) given the concentration of minorities in a class.

I believe my data holds important implications for diverse classrooms, but I admit its limitations in hopes that similar research will improve upon it. My sample size of three teachers' classrooms limits my ability to generalize. Also, the texts I observed were not, in all cases, overtly "multicultural," and the research would be more specific if the traditional and multicultural texts were very distinct from each other. Finally, my data had no way of representing individual students. I hope all of these improvements will be made by others so that we continue to learn the best ways of involving both diverse literature and diverse voices in the secondary English classroom.

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Re-membering Mathematics: The Effect of Culturally Relevant Math History Lessons on Students' Attitudes

John Troutman

With Leah McCoy, Ed.D.

Wake Forest University
Department of Education
December, 2005

Introduction

Students from some oppressed racial backgrounds in modern US classrooms are (on average) experiencing a deep sense of disconnection from their mathematics classes. This phenomenon is evident in the gap in achievement between African-American, Native American, and Latino/a students with their White counterparts, as well as through other measures of student engagement-such as rates of enrollment in advanced courses, rates of absences from math courses, and student reactions to their classes and teachers (Lloyd, 2001; Peng, Wright, & Hill, 1995). Many scholars have attributed the disconnection experienced by African-American, Native American, and Latino/a students from mathematics-in part-to the absence of these students' cultures in the traditional curriculum (Bishop, 2001; Lloyd, 2001; Wagner, Ray, Ecatoiu, & Rousseau, 2000). The National Council of Teachers of Mathematics has recognized these disturbing trends. In the latest version of *Principles and Standards for School Mathematics* (2000) the authors listed equity first among their six guiding principles for school mathematics. The *Standards* document challenges educators to find new and innovative ways to reach the students that are currently underserved in math classrooms (Trafton, Reys, & Wasman, 2001).

Review of Literature

One attempt at transforming the traditional mathematics curriculum so that it is might be effective in reaching students from non-dominant cultural backgrounds is known as culturally relevant pedagogy. Culturally relevant lessons appeal to students from diverse cultures by utilizing cultural referents and/or traditional learning styles of students from oppressed backgrounds (Wagner, Ray, Ecatoiu, & Rousseau, 2000). The successes of innovative lessons that appeal to diverse cultures in improving students'

attitudes towards classroom subject matter have been well documented (Frankenstein, 1990; Ladson-Billings, 1995; Lloyd, 2001; Moses & Cobb, 2001).

A referent available to educators who want to create culturally relevant math lessons is the history of the discipline. Lessons on the diverse roots of mathematics meet the goals of culturally relevant pedagogy by developing the "cultural competence" of students, encouraging them to understand the cultural underpinnings of mathematical thought (Ladson-Billings, 1995, p. 160). Simultaneously, these kinds of lessons help students forge a deeper connection with their math classes by linking course material to the specific individuals and situations (Furinghetti, 1997). Research suggests that, by "situating" the learning of abstract concepts in the context out of which they developed educators can improve students' attitudes towards academic work (Kirshner & Whitson, 2000, p. 4). Finally, math history lesson can improve students' attitudes toward learning by providing students with examples of individuals who have achieved great success in math. These lessons can encourage students to connect with historical figures as role models (Furinghetti, 1997). Through the development of these kinds of relationships, instructors develop more positive attitudes in those students (Taylor, Lerner, von Eye, Bobek, Balsano, Dowling, & Anderson, 2003).

The act of re-membering mathematics involves reconstituting math history to include the diverse (and oft excluded) individuals who played roles in the construction of mathematical thought. This process holds great promise for reconnecting students from oppressed racial backgrounds to the discipline. Research on the effects of culturally relevant pedagogy, situated learning, and role model development suggests that history lessons on the development of the mathematics could encourage students to develop a more positive attitude toward the subject. This study sought to test the validity of hypotheses based on these theoretical foundations by exploring the following question: What are the effects of culturally relevant math history lessons on students' attitudes towards the discipline?

Methodology

This study explored the proposed question through mixed methods data collection and analysis. This methodology was constructed in order to simultaneously measure the

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net change in attitude of a group of students while engaging the unique perspective of each individual student.

Participants were students in a non-honors level Algebra II class at a high school in central North Carolina with a majority African American student population. The mathematical background and cultural diversity of the students in the class made it ideal for exploring the proposed question.

The math attitude of each student was measured both before and after a series of lessons on math history through surveys and individual interviews. Questions in the survey focused on three attitude scales modified from Fennema and Sherman's (1976) "Instruments Designed to Measure Attitudes Towards the Learning of Mathematics by Females and Males." Two scales were taken directly from the work of these researchers: the "Attitude Towards Success in Math" scale and the "Mathematics Usefulness" scale (p. 325-326). Additionally, a third scale, Mathematics as a White Domain, was modified from Fennema and Sherman's "Mathematics as a Male Domain" scale to more effectively address the question of this study (p. 325).

Data was analyzed using t-tests for significance between the means of student responses on pre-lesson and post-lesson Likert-type surveys. Additionally, qualitative analysis provided more in-depth information about the intricate differences in students' attitudes based on their responses to questions in individual interviews.

Results

There was no significant difference between mean student responses in the three categories before and after the students were taught about the history of mathematics (see table 1). However, qualitative data from the student interviews does suggest that learning math history had some affect on students' attitudes.

Students were not likely to attribute success solely to good luck (a hallmark of students with negative attitudes towards success) either before or after the lessons. Though this result suggests that students exhibit a sense of agency with regard to their math achievement, thus a positive attitude with regard to success in mathematics, interview data revealed the students' tendency to focus on of self-blame for low achievement rather than self-efficacy regarding their success. In follow-up interviews,

students were much more likely to exhibit a genuine sense of ownership with regard to their success accomplishing mathematical tasks.

Students also indicated viewing math as useful on surveys before and after the lessons; however, interview data suggests that students experienced a change in the way they thought about math's usefulness as a result of the lessons, which placed math concepts in outside of class historical contexts. Before the lessons, most students expressed their general feeling that "math is everywhere," but they were unable to talk specifically about the aspects of their lives in which they used it. After the lessons students not only continued to express their belief in the usefulness of math, but they were able discuss examples of times when people have used mathematical thinking and the role that math played in helping them solve their problems.

Finally, survey data indicated that the participants did not view math as a White domain either before or after the lesson series; however the students did make assumptions about mathematical capability of individuals in interviews prior to the lesson which they rejected in post-lesson interviews. In these follow-up discussions, students displayed a much higher degree of critical thought about the role of racism in constructing history and the degree to which the knowledge production of people of color tends to be downplayed or ignored in traditional academic settings.

Conclusions and Implications

This study has detailed the experiences of one novice teacher trying to accomplish the goals set by NCTM to create a more equitable math classroom. While by no means perfect, the lessons in this study were taught in a way that encouraged the contextualization of mathematical learning while addressing the goals of role model development theory and culturally relevant pedagogy. Despite the imperfections of the lessons and other constraints of the study, participating students displayed signs of genuine change with regard to each of the three attitude scales tested. These modest but meaningful results should serve as an encouragement to other educators who are striving to make math meaningful and forge connections between the material and their students' lives. Additionally, these results point to the need for further research regarding the issues involved with historical constructions, racial oppression, the development of role models, and the cultural relevance of traditional mathematics curriculum.

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Multiple Intelligences in the English Classroom

Margie Van Orden

With Joseph Milner, Ph.D.

Wake Forest University
Department of Education
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Introduction: All students have different strengths and weaknesses in school, and one of the most important aspects of teaching is using students' strengths to their greatest potentials for learning. One way of discovering students' strengths is through Howard Gardner's theory of Multiple Intelligences (1983). This theory states there are at least eight different ways of perceiving the world, and Gardner labels each of these as a distinct "intelligence." He encourages teachers to employ a balanced instruction that emphasizes a variety of the intelligences. In doing this, teachers are allowing students to learn in ways that help them reach their greatest potentials as well as pique their interests.

In this research project, I wanted to gain a better understanding of how mainstream teachers, who face a wide variety of student-learners in their classrooms, vary their teaching techniques (or don't) from high-level to low-level English classes. Because I believe it is important in today's education, I was particularly interested in observing how these teachers incorporated the multiple intelligences into their lessons.

Review of Literature: One teaching strategy that addresses a great number of learning styles in variety of ways is Howard Gardner's Theory of Multiple Intelligences which was first published in *Frames of Mind: The Theory of Multiple Intelligences* in 1983. Gardner argues that human beings have at least seven separate intelligences:

1. linguistic intelligence (as in a poet);
2. logical-mathematical intelligence (as in a scientist);
3. musical intelligence (as in a composer);
4. spatial intelligence (as in a sculptor or airplane pilot);
5. bodily kinesthetic intelligence (as in an athlete or dancer);
6. interpersonal intelligence (as in a salesman or teacher);
7. intrapersonal intelligence (exhibited by individuals with accurate views of themselves) (1993)

Through his examinations of brain damaged subjects, prodigies, idiot savants, autistic children, and children with learning disabilities, Gardner developed his theory of multiple intelligences where each one has its own developmental path. He explains, "All of us possess each of the intelligences, but no two individuals exhibit exactly the same profile of intellectual strengths and weaknesses" (1995, 16). It is the differences of intellectual strengths and weaknesses that make each student a unique learner. Many educators argue that teachers need to be addressing all of these intelligences, not only the verbal and logical intelligences, in their classrooms.

Initially, the theory was mostly accepted by the educators of special fields, either learning disabled or gifted and talented, but eventually, interest grew to include teachers of all ages and all disciplines. Schools based on Gardner's theory are student-centered, project-oriented, give the student choices in almost all their lessons, provide ample opportunities to employ the different intelligences, and offer assessments and evaluations based on the theory (Armstrong, 1996, Campbell, 1992, Dickinson, 1996, Lazear, 1991). Gardner argues that multiple intelligences are useful in two ways—as the content of instruction, and as a means or medium for communicating the content. For a student who is weak in math, he or she will not learn the content if it is taught only in math terms; the instructor needs to tap into the student's stronger intelligences in order to teach the math concept. The theory allows for multiple entry points into whatever concepts are being taught, maximizing the learning opportunities for students. The theory can also be applied when designing curriculum units and assessments.

Since the original publication of his theory, Gardner's Multiple Intelligences has been extensively scrutinized and widely accepted by many researchers in the education field. Thomas Armstrong has written books supporting the theory as well as Lazear and Campbell. Additionally, the theory is gaining strong support from teachers themselves. Teachers find that by employing the multiple intelligences, their classrooms have become more alive and engaging, and that their instruction provides some students with unique opportunities to show their strengths. One teacher found that "the students were, almost without exception, highly engaged in the projects they would undertake [when using multiple intelligences], often far more so than they were when being evaluated through conventional writing" (Smagorinksy, 19).

Although most of the articles written about the multiple intelligences are in support of the theory, there is very little empirical evidence of the theory's success. Despite the lack of empirical evidence, teachers tend to hold themselves accountable for what students learn. More and more teachers are recognizing multiple learning styles in their students and adopting multiple forms of instruction in their classrooms.

Research Questions: (1) How prevalent is each of Gardner's multiple intelligences in the high school English classroom? (2) Does the prevalence of specific multiple intelligences differ between the higher and lower-level English classes? (3) How does this compare to the prevalence of visual, auditory and kinesthetic learning styles?

Methodology: *Subjects:* The subjects of this study were all students in four teachers' English classes at a Forsyth County high school. The students ranged from 9th to 12th grades. Half of the classes were high-level courses (honors seminar, AP, or electives) and half of the classes were regular or low-level courses (regular, or practical).

Methodology: This was a qualitative study using ethnographic methods to research the similarities and differences between high and low-level English classes and the prevalence of multiple intelligences in these classes. The study also included the prevalence of visual, auditory and kinesthetic teaching styles.

To collect data for the study, I observed 40 English classes, 20 high-level and 20 regular or low-level. I took detailed field notes of four different English teachers during five high-level classes and five low or regular level classes. After coding all the data, I created a chart that listed the number of times each teacher used a specific intelligence and a specific learning style in their high-level classes and in their regular or low-level classes. I then looked for themes found in the two groups. I used these themes to interpret what the similarities and differences were between the instruction of high-level and low-level English classes based on multiple intelligences and based on learning styles. I graphed the percentages of each intelligence and learning style in high-level classes, low-level classes and both combined. I also graphed the number of times each teacher used each intelligence and learning style in high and low-level classes. Finally, I compared the

prevalence of the various multiple intelligences with the prevalence of the three learning styles.

Results and Conclusions: Overall, the four teachers studied incorporated the verbal/linguistic intelligence the most frequently. This intelligence appeared in 51% of the activities administered in both high and low level classes. The next most frequently used intelligences were the logical/ mathematical which comprised 18% and the visual/spatial intelligence which was observed 17% of the time in all classes combined. The interpersonal intelligence occurred 11% of the time, but was used very differently in high and low-level classes, and among the different teachers.

There were some discrepancies between the prevalence of certain intelligences in high and low-level English classes. In general, the high-level classes had a wider variety of intelligences and the lower-level classes had more logical and visual intelligences observed in the classes. The verbal intelligence was used the same amount, 51% of the time, in both groups of classes. The logical intelligence was used 22% in the low-level classes and only 12% in the high-level classes. The lower-level classes also had slightly more visual/spatial intelligence, 18% compared to the high-level's 16%. The major discrepancy lies in the use of more varieties of intelligences in high-level classes. In high-level classes the interpersonal intelligence is used more frequently, 15% of the time compared the low-level's 8%. The high-level classes also recorded at least one instance of bodily/kinesthetic, intrapersonal, and musical intelligences. Combined, these three intelligences occurred 6% of the time in high-level classes and only 1 % of the time in low-level classes.

Comparing the use of learning styles reveals more information about teaching styles. Overall, auditory instruction was used an average 43% of the time. Visual-auditory was used the second most often overall at 24%. Kinesthetic and the trio-V-A-K were used 11 and 9% respectively. There was only a 2% difference between the use of auditory instruction in high and low-level classes, but there were two other important differences. First, the high-level classes have a more even distribution of the learning styles, and second, there is significantly more use of the kinesthetic learning style in high-level classes. When all the categories using kinesthetic learning are combined, they total

42% in the higher classes and only 16% in the lower classes. Therefore, kinesthetic learning occurs almost three times as much in higher-level classes.

Overall, one can conclude from these observations that high and low-level classes are mostly being taught the same way— using the verbal/linguistic and logical/mathematical intelligences, and the auditory and visual-auditory learning styles. When teachers do stray from the most common styles of teaching, however, they tend to stray more frequently and perhaps a littler further in their higher-level classes than in their lower-level classes. There could be a number of reasons for this including the notion that teachers are more willing to experiment with student-centered classes in high-level classes. There were several shortcomings with this research project. The most challenging aspect of it was coding the data because several activities included more than one category and were used for different amounts of time. Also, the classes that were used to compare the high and low-levels of instruction were not the same course and grade level; therefore, a Shakespeare course was compared with a regular World Literature class. To enhance and expand this research, I would like to include many more hours of observation, a wider variety of teachers, and a more controlled environment.

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Making Lasting Impressions:
Teachers' Use of the First and Last Five Minutes of Class Time

Cameron F. Wells

With Joe Milner, Ph.D.

Wake Forest University
Department of Education
December, 2005

Introduction

Teachers report they tend to take care of non-instructional tasks at the beginning and end of class, when they are least intrusive and will not interrupt instructional activities. These tasks can take anywhere from two or three minutes to longer, depending on the specific job. Although "bookending" instructional time with other duties may be the most logical decision for teachers to make, this conclusion has scant scientific support.

Recent brain research suggests that the brain operates using a *primacy/recency effect*, and therefore the first and last minutes of class should be spent in learning new material. The brain's ability to remember the first and last items in a list, while rarely storing the 'middle' information is counter to many teachers' inclination of class time design. Sousa (2002) even suggests that roll-taking and announcement making should be completed at the chronological middle of the class, and new material be introduced and discussed right after the first bell and in the few minutes leading to the last bell.

Given the problematic nature of time use and the many demands on student and teacher time, the goal in this study is to determine how four expert teachers choose to spend the first and last five minutes of class.

Review of Literature

How the Brain Learns, a comprehensive, research-based teaching text, echoes earlier texts in supporting the role primacy-recency effect has on student recall, but takes the discussion to a new level (Sousa, 2002). Sousa suggests that new material be presented at the beginning of each learning session, when students are in "prime I" stage and administrative tasks be completed in the subsequent "downtime"(2002, p.192). The researcher recommends 20 minute lessons where research shows 18 minutes, or 90% is spent in the prime learning

stages. Unfortunately, even if a teacher plans multiple lessons within a block schedule class, prime stages for learning are often spent taking attendance, making announcements or giving students free time. Other researchers suggest training students early that teaching will begin and end at the bell and imposing penalties on students that choose to spend class time on personal tasks(Clough, et al, 1994). The issue of how teachers choose to use their class time is clearly critical to the flow of the class as well as the individual learning of each student.

Further exacerbating the problem of class time and time spent in instruction is the continual increase of teacher tasks. Hargreaves (1992) echoes these concerns from his own study of American teachers. The implications for students are there is less time to create innovative lessons and less instructional time available for content and skill teaching. The primacy-recency effect demands students grapple with new content when their brains are most receptive and be frequently presented with novel information or skills so as to minimize breaks in recall. The increasingly-common block schedule, however, makes this ideal type of instruction less likely, as does the high load of administrative tasks teachers must accomplish in limited times (Easthope & Easthope, 2000). The resulting conflict will be the subject of this ethnographic study.

Research Question

    (1) How do teachers choose to fill the first and last five minutes of class?

    (2) Is there a difference in frequency between the use of instructional and non-instructional activities during this time?

Methodology

(a) This ethnographic study used qualitative methods of observation and recording to observe teachers' use of the first and last five minutes of class time.

(b) I observed each subject a minimum of 9 times, for approximately 50 minutes each session. The 9 observations were not made from a single class; rather, I ensured a more comprehensive perspective by observing all of the classes each teacher instructs. During each observation I recorded the actions of the teacher on a minute-by-minute basis for the first and last five minutes of the class. Actions were first recorded as instructional or non-instructional, then elaborated upon in field notes. Instructional actions were classified as "preparatory," "new content" and "review/assessment." Non-instructional actions were classified as "administrative", "relationship-building" or "other." If there was

simultaneous action- a teacher talking about last night's game while taking attendance, for example- marks were made in both the "administrative" and "relationship-building" categories.

(c) To analyze the narrative data I first tallied the instructional and non-instructional minutes spent by each teacher and by the collective group of subjects. The data were then analyzed for repeated or common trends in how teachers spend these ten minutes. The data is reported in a narrative format that identifies teachers' inclinations with regard to class structure, as they appear, and then hypothesizes the possible implications for students.
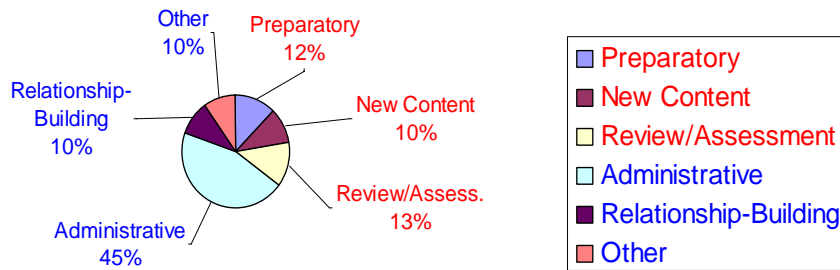
Results

Based on the actions of the four master teachers during the first five minutes of class, it is clear that a majority of that time is used in non-instructional activities. My observations and data analysis suggest that 65% of those five minutes are spent in administrative, relationship-building or other pursuits. Taking attendance, in particular, was the most common non-instructional activity observed among the four teachers during the first five minutes.

Approximately 35% of the first five minutes is spent in instructional activities, including preparing for a lesson, actually teaching new content or reviewing/assessing previously acquired knowledge. My observations suggest that the most common instructional activity during this time period is review, followed by preparation for an upcoming lesson.
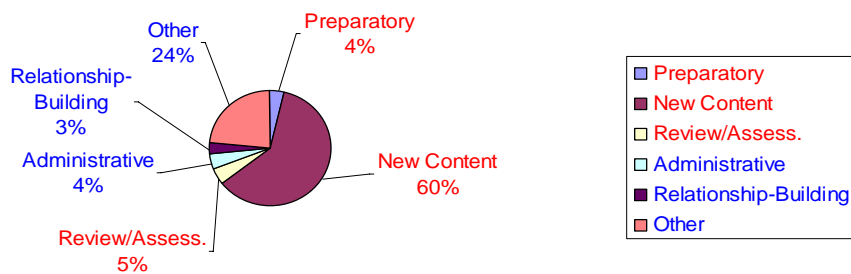
During the last five minutes of class, the four master teachers spent almost 70% of their time in instructional activities, with a majority of that time involving new content. This data supports the adage, "work 'till the bell," and I observed many classes where final instructions and assignments were yelled by the teacher as the students were going to their next class. In one class in particular, Teacher B refused to fix the clock in his room and students were unaware of the impending end of class and therefore did not "pack up early."

Approximately one-third of the last five minutes of class was used for non-instructional acts. Analysis of the data suggests the most common activity was loosely termed, "other." Most often, this non-instructional time use was giving students free time before the bell.

Teachers' Use of the First Five Minutes of Class

Other 10%
Preparatory 12%
New Content 10%
Review/Assess. 13%
Administrative 45%
Relationship-Building 10%

Legend:
- Preparatory
- New Content
- Review/Assessment
- Administrative
- Relationship-Building
- Other

Teachers' Use of the Last Five Minutes of Class

Other 24%
Preparatory 4%
New Content 60%
Review/Assess. 5%
Administrative 4%
Relationship-Building 3%

Legend:
- Preparatory
- New Content
- Review/Assess.
- Administrative
- Relationship-Building
- Other

Conclusions

As the adage goes, "time flies, when you're having fun." Apparently an omitted addition to the phrase is, "or when you're in the classroom." In fact, a common complaint of teachers is that they do not have adequate time to cover the material and do everything else required of them. This study suggests that the frustration many educators experience may be lessened by using the time they do have in a more efficient manner.

During the first five minutes of class, for instance, time spent in administrative duties ranged from 22% to 67% across the four teachers. Within the context of a single day, the data suggests that teachers spend between 1 and 3.5 minutes per period, per day in this non-instructional activity. Projected for the entire year (180 school days), this means that between 3 and 10.5 hours-per period- are spent each year, mainly taking attendance. Such a significant amount of time would be sufficient to conduct a literary unit, write a research paper, or perform a play.

The data suggests teachers use the last five minutes of class differently than they do the first. The average of the four teachers' individual patterns of usage illustrates that approximately ⅔ of class time is spent in instructional activities. This trend most likely reflects the movement to increase "time on task" that is prevalent in many schools. My observations show that these last minutes were most often spent completing class assignments or group work.

Despite the positive results for instructional time use in the last five minutes of class, there are some detractors. Most noticeably is the high incidence of "other" activities during that time period; "other" was most often used to describe 'free time,' when the teacher was not conducting class and students were able to socialize or do as they please. "Other" time ranged from 15% to 34% of the last five minutes, indicating that between 45 seconds and almost 2 minutes were spent with nothing to do each day. That results in a loss of 2 ½ to 6 hour loss by each student in each class over the course of the school year. Again, this time could be used in instructional activities if the teachers chose to do so.

The conclusions drawn from this study are not meant to criticize four teachers for their use of class time; rather, this study hoped to provide insight into how teachers use their time and suggest how those patterns might be altered to better align with current brain research. There is undoubtedly a need to record present and absent students, to build relationships with students and perform all the other "non-instructional" acts teachers perform every day. It is counterproductive, however, to conduct these actions when students' brains are most ripe for new information. By simply rearranging the activities of each class period, teachers may enjoy better work product and recall from their students with no additional effort on their behalf.

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