

MAINSTREAM AND ELL COLLABORATION:

A CASE STUDY

OF A MATHEMATICS CLASSROOM

by

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To Chris, Michael and John
for showing me the pathways to success.
Believing in yourself.
Questioning things you do not understand.
Being willing to take risks.

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CHAPTER ONE: INTRODUCTION

Last year, I began a job teaching English language learners as a Language Academy teacher at a new school. Students scoring Level 1, and some scoring Level 2, on the Oral Language Assessment Scales (LAS) are eligible for Language Academy. This is a program for students with very beginning English language skills (*ELL Staff Handbook, 2001*). I was going to work with the first and second grades. There were three first-grade teachers and three second-grade teachers. I knew that, as a Language Academy teacher, I was supposed to collaborate and team-teach with all of the mainstream teachers. I was replacing two Language Academy teachers who had taught at the school the year before. One of those teachers team taught with a first grade teacher, the other teacher team taught with a second grade teacher.

On my first day at the school, I was told by a first grade teacher that she was not going to be the collaborating teacher working with Language Academy any more. She thought that another first-grade teacher should have "the opportunity" to collaborate. I also saw all the Language Academy materials that had been stored in her room lying out in the hallway. Then the second-grade teacher who had collaborated with Language Academy the year before told me the same

thing. This teacher also said that she wanted to give another colleague "the opportunity" to collaborate with Language Academy. I was told that the Language Academy materials stored in her room should be moved out when I found another space for them.

Of the six teachers with whom I was suppose to work, only one of them was willing to team with me, and that commitment was for one hour out of the day. I had no teaching space, so I was given a cart to store and transport my materials. I had to find empty spaces in my building to teach my students. I had to move my students throughout the day because the spaces I was using were also used by other classes. A large portion of my day was spent teaching in the cafeteria from my cart.

These circumstances made me feel as though neither my position nor my students were valued at that school. They also made me wonder whether collaboration with the mainstream even was possible.

This is the real situation I found myself in at the beginning of the 2002-2003 academic year, my second as a Language Academy teacher. It is because of this experience that I wanted to find out why St. Paul's ELL¹ (English Language Learner) Department thought that, in order to be effective, ELL teachers needed to collaborate with the mainstream.

Collaboration in St. Paul

I am a Language Academy teacher in St. Paul. Language Academy exists to provide Level 1 and 2 English Language Learners with an education that builds background knowledge in order to foster academic success and language skills at their grade level. Language Academy students are part of a mainstream classroom. Collaboration and team teaching with mainstream teachers are requirements of my job. St. Paul's ELL Department tells me that in order to be an effective ELL Language Academy teacher, I need to know how to effectively collaborate with mainstream teachers while meeting the language needs of my English language learners.

Up until the fall of 1999, ELL services in St. Paul were provided primarily through "pull out" models of instruction. In this model, ELL teachers pulled their students from the mainstream classroom in order to work on developing the oral and written language skills of their students. In the district's Teaching English to Speakers of Other Languages (TESOL) model, Level 1 English language learners were taught content and language skills in a self-contained classroom by an ELL teacher. Collaborative teams were not encouraged in St. Paul up until that time. As ELL teachers, we were able to teach our classes with little or no communication with the classroom teachers. Often, neither teacher knew what the other one was doing.

Then, in the fall of 1999, the ELL department of St. Paul, under the

¹Although ESL is used by some to designate programs, classes, and teachers, I am following the custom of my district, which uses ELL for students but programs, courses, and teachers.

direction of Valeria Silva, began the first phase of its initiative to focus on developing collaboration between mainstream and ELL teachers. All ELL elementary sites began implementing one of several models developed by the ELL department (*ELL Staff Handbook*, 2001). As ELL teachers, we were to no longer work independently from the classroom teachers. Also, the collaboration-based Language Academy model replaced TESOL. In the Language Academy model, an ELL teacher worked collaboratively with a mainstream teacher, and the English language learners themselves spent most of their day, in the mainstream class.

My Experience with Collaboration

During my first three years of teaching, I taught ELL using a pull out model for instruction. Then, I began teaching in a Language Academy. I team taught my first year with two second-grade teachers. I had two hours a day in which I pulled my Language Academy students for reading and language development activities using sheltered ELL instruction. I was in the mainstream classroom for the remainder of the day with my students. At that time, I had not had any training in collaboration. I sometimes felt that my students' language needs were not met in the mainstream classroom and that the content of the instruction was not appropriate for their language level or their ability level in a particular content area. I asked myself, "Is there a better way to do this?" I was working with experienced classroom teachers that usually controlled the content of what was

being taught and how to teach it. I did not always feel that I had the expertise that I needed to influence their decisions.

Last year, as I told in my story at the beginning of this chapter, I was in a Language Academy setting working with students who came from six different mainstream classrooms. The principal and teachers set up the program before I was hired. I found that because collaboration and teaming were nearly impossible with so many teachers involved, I actually followed a pull-out program (which goes against the philosophy of focused collaboration as implemented by the St. Paul ELL department). I teamed with just one first grade teacher for a one hour reading block. Again, I felt that I needed more knowledge and expertise in collaboration and team teaching so that I could support the development and implementation of an effective collaboration model. I also realized that in order for principals and teachers to support collaboration, they needed to understand why and how it works.

Concerns Raised by Collaborative Models for ELL

My experiences with collaboration raised two sets of concerns for me. The first, which I identified above, were related to program implementation. These included negotiations between teachers for space, use and storage of materials, time to collaborate, and determining how and what to teach.

I was teaching ELL in an elementary school in St. Paul at the time that the ELL department began implementing ELL models of collaboration. The idea of collaboration was not met favorably by many ELL or mainstream teachers

throughout the district. Buckley (2000) discusses several factors that can contribute to the failure of collaboration attempts. I observed several of these factors among my colleagues. A major issue seemed to be that many teachers just resisted change of any sort. Another issue was that ELL teachers thought that they would be unable to find a compatible teacher with whom they could work. A third issue was that of control. Both classroom and ELL teachers wanted to control the content of what was to be taught and how to teach it.

My second set of concerns was related to the language development of my English language learners. I did not know how students' language developed either in general academic settings or in specific content areas. I think this also was a major the issue behind ELL teachers' district-wide resisting teaming with mainstream teachers. They did not know how they would be able to meet the language needs of their students in a mainstream, collaborative setting.

I have seen ELL teachers attempt to collaborate or team teach with classroom teachers, but often the ELL teachers gave up and went back to the pull-out model. ELL teachers felt that the language needs of their students were not being met in the mainstream classroom. They felt that these needs would be better met with sheltered ELL instruction provided in a pull-out setting.

Teaching Mathematics in Collaboration with the Mainstream

In order to research what makes an ELL collaborative team effective, I wanted to focus on an area that is often ignored in ELL collaborative settings. In St. Paul, we use the *Everyday Math* series to teach mathematics. Two years ago in my second-grade math class, we divided the students into three heterogeneous ability groups, an arrangement which is recommended by the authors of this series. I often felt that my students were not getting the math concepts they needed when they were in groups, which included students with high math skills who were also native English speakers.

At a training in teaching *Everyday Math*, I asked the trainer if this series was developed with second language learners in mind. The answer was that it probably was not, but because the material spirals (concepts are covered again and again throughout the series), it would be good for English language learners because the material is repeated throughout the grade level curriculum.

I wanted to see how teachers make use of ELL methods while collaborating during math instruction. Mathematics is a content area in which I believed the language needs of English language learners are not always met. I wanted to focus on mathematics instruction because it is a mainstream content area and it has been considered an area English language learners can be successful in regards to computations, but math language has been ignored. I had been questioning how to effectively teach mathematics to English language learners.

Language is the medium through which students will learn mathematics. Literacy is the goal of education and it needs to be an explicit goal of

mathematics education, too (Krussel, 1998). I wanted to explore how ELL teachers meet the language needs of their students while working in a mainstream collaborative setting with a mathematics teacher by watching a team plan together and teach together.

Conclusion

In conclusion, I wanted to know how ELL teachers and mainstream teachers collaborate while also ensuring that the language needs of their English language learners are being met in a content area, such as mathematics. Collaboration among teachers in elementary schools is advocated by many but has been studied by few (Riley, 2001). There has been much written on collaborative teaching but most of the research done has been on special education and mainstream collaboration. I wanted to look at collaboration between ELL and mainstream teachers. In my paper, I want to identify how successful collaborating ELL and mainstream teachers not only collaborate in the teaching of mathematics, but also how they meet the language needs of their students so that they are able to achieve a high level of English proficiency.

Throughout my paper I will seek to answer the following question, "How do collaborating mainstream mathematics and ELL teachers work together (co-teach) while addressing the language needs of their English language learners in a mathematics classroom?" Chapter Two of my paper reviews the existing literature on collaboration and on teaching language through content instruction in mathematics.

CHAPTER TWO: LITERATURE REVIEW

Introduction

Since the school reform movement began in the United States with the release of *A Nation at Risk* in 1983, there has been a lot of attention focused on improving the quality of education (Riley, 2001). A major component of this discussion has centered on the need for collaboration between teachers as a means to form teaching teams in order to improve all aspects of teaching. Almost all the research done on collaboration has been between special education and mainstream. Very little research has been done on ELL and mainstream collaboration. In this chapter I will be discussing what collaboration is, identify some of the problems teachers have with collaboration, and identify some of the factors that make collaboration and teaming work. Then I will discuss what the research says about why we need to collaborate in ELL and how language is best learned through content. Finally, I will focus on the connectiveness of mathematics and language and what some of the effective practices are in teaching mathematics to English language learners in the mainstream.

What is Collaboration/Team Teaching?

Collaboration does not necessarily mean that teachers are sharing a teaching space or working with the same group of students. The teachers may be coordinating curriculum and sharing ideas, but the teachers are teaching different students in separate rooms. Collaboration is always a component of teachers that team together in a classroom (co-teaching). In addition to coordinating curriculum and sharing ideas, these teachers are teaching the same students in the same teaching space. The benefits gained from working only in collaboration are therefore always part of the benefits gained by teachers that co-teach. In St. Paul, much of the emphasis on collaboration is on mainstreaming the English language learners with the pull-in of an ELL professional so that language and content teaching can be integrated in the mainstream classroom. For the purposes of this paper, I am looking mostly at the models of collaboration in which the English language learners remain in the mainstream classroom and the classroom teacher is co-teaching with an ELL teacher. The research shows that this model is the most effective in helping English language learners learn.

Many researchers have defined collaboration teaching. Team teaching is an approach in which two or more persons are assigned to the same students at one time for instructional purposes. Cooperative teaching involves educators who work within the general education setting and share responsibility for planning, implementing, and evaluating instruction; disciplining and grading students; and communicating with students' families. Grading papers or leaving the room while

a team member is teaching violates the intent of teaming (Gurman, 1989; Hatcher, Hinton & Swartz, 1996; Pugach et al., 1995 as cited in Anderson & Speck, 1998; Salend, Gordon, and Lopez-Vona, 2002).

There are several approaches to collaboration. No single approach should be used all the time. Five different approaches to collaboration in teaching have been identified: 1) Major Teacher/Assisting, 2) Parallel Instruction, 3) Station Teaching, 4) Supportive Teaching, and 5) Team Teaching (Bean, Grumet & Bulazo, 1999; Cook & Friend, 1998; Friend & Barsack, 1990). Teachers who collaborate may use one approach or all five approaches at different times, depending on which one fits their needs. In the Major Teacher/Assisting model one teacher teaches the group while the other teacher monitors. In Parallel Instruction the teachers are teaching the same content to different groups of students. Instruction may be paced differently or a different emphasis may be placed in particular subject matter. With Station Teaching, two teachers divide instructional tasks and prepare activities for stations. In Supportive Teaching (alternative teaching) one teacher assumes responsibility for directing instruction to the majority of students in the class. The other teacher works with a small group or an individual while focusing on the students' needs. When using Team Teaching, teachers share the instruction of the lessons with each other. They may take turns leading a discussion, demonstrating concepts or learning models, and model appropriate question and answer techniques.

Some Problems with Collaboration

Anyone who has attempted to collaborate with another teacher has run into at least some difficulty. Friend (as cited in Brownell & Walther-Thomas, 2002) says the biggest barrier to collaboration is time. Teachers are already short on time and teachers working in collaboration need even more time for planning and preparation (Bean, et al., 1999). McKenna (1989) points out that two hours a week of team planning time is the amount experts consider a minimum for effective preparation to team teach (as cited in McQuade, 1992). Many teachers feel that they just do not have this extra time.

Friend (as cited in Brownell & Walther-Thomas, 2002) also states that some teachers fear that collaborating to meet the needs of a diverse group of children may result in slowing the progress of typical learners. She has found that teachers can have mindsets that work against collaboration. Teachers can be territorial about classroom space and teaching procedures.

Fradd (1992) has found that teachers that chose to collaborate often gravitate toward those with whom they feel comfortable and compatible. This often promotes the status quo. People with different values must be prepared to deal with different ways of thinking and communicating (Bean, et al., 1999). This is probably one of the hardest things for a teacher to do.

Bean, et al. (1999) discuss other difficulties to implementing a successful collaborative program. They say that these obstacles include practical problems such as noise, distractions and space and the lack of understanding of how to implement a collaboration model. ELL teachers have a double challenge when

they collaborate. They have to maximize their own language instruction and also make instructional recommendations to the mainstream teachers who are teaching English language learners (Enright & McCloskey, 1985). Mainstream teachers often lack understanding of second language acquisition and the attitude which facilitates English language learner achievement (Clair, 1995). Schoolwide collaboration and program integration are very difficult if there is little administrative support (Fradd, 1992).

Some Factors that make Collaboration and Teaming Work

According to Friend (as cited in Brownell & Walther-Thomas, 2002) and Sakash and Rodrigues-Brown (1995) one of the most important factors in making collaboration a reality in schools is the principal. She suggests that principals provide opportunities for lunch hour study groups where teachers read about and discuss issues related to collaboration; working committees where members are taught strategies for working effectively and group problem solving; and external consultants to meet with staff to identify concerns and resolve them. Riley (2001) says that effective principals stay away from philosophical and personality issues. Principals remind teachers that their purpose is to help children learn and the best way to do that is to develop useful plans with their teaching partners.

Successful team collaboration not only requires administrative support, but also hinges on personality traits and positive interaction between team members. Honesty, flexibility, the ability to communicate, and confidence are contributors to a team's success (Bean, et al., 1999; Friend as cited in Brownell & Walther-

Thomas, 2002; Sakash & Rodrigues-Brown, 1995; Shields as cited in Riley, 2001; Riley, 2001). Skills in group dynamics, team building and interpersonal problem solving are needed because many educators have not been prepared to work in groups. Instruction in these areas as well as running effective meetings, leadership styles and similar topics is helpful (Adams & Cessna, 1991; Friend as cited in Brownell & Walther-Thomas, 2002).

Planning is critical to both the students' and teachers' success. McQuade (1992) and Echevarria, Vogt, and Short (1999) discuss the importance of team planning time in making collaboration work. During team planning time teachers should discuss student needs, instructional plans and exchange information on subject matter and pedagogical strategies. Planning must produce lessons that enable students to make connections between their own knowledge and the new material being taught. A team planning period can only pay off if administrators and teachers share an understanding of the rationale, purpose and benefits of team planning. Scheduling time to plan does not guarantee meeting a program's objectives. In a workshop I attended entitled *ELL/Mainstream Collaboration Training*, the presenters suggested that the planning time must be used to plan a program, assess and evaluate its effectiveness and reflect on the changes or improvements that can be made. Teachers need to be patient in building their teams. Building an effective team takes time. Rutherford and Fullan suggest that a minimum of three years are needed to reach an effective team level. (as cited in McQuade, 1992)

Sakash and Rodrigues-Brown (1995) identify some other factors of why some schools achieve greater success in teaming than other schools; low teacher turnover, stability of student population and a supportive structure already in place at the school.

Why We Should Collaborate in ELL

In the St. Paul Public School District, there are approximately 53 languages and 70 dialects represented by students from more than 60 different countries. Approximately 40% of all St. Paul Public School students are English language learners (*ELL Staff Handbook, 2001*). In order to better meet the academic needs of its students, the ELL department began to implement collaboration with the mainstream in the fall of 1999 at the elementary level. The St. Paul ELL department believes that collaboration is one of the most important components of any successful ELL intervention district wide.

During the 2001-2002 school year Mary Ann Saurino, Title VII coordinator for St. Paul Public Schools, conducted research in collaboration with the ELL department of St. Paul Public Schools in order to identify better practices in the education of English language learners (Saurino, 2002). She identified nine principles of successful schools for English language learners that came from her review of existing literature on effective instruction for English language learners and extensive interviews with St. Paul administrators, educational and teaching assistants and practicing classroom, ELL, specialist and special education teachers. From her research, Saurino concluded that, "Schools that are effective

for English language learners deliver instruction that is planned and delivered by teachers working in collaboration" (p. 50).

I began to read about teaching English language learners in the mainstream classroom and on effective collaboration. Collaborative interdisciplinary models should be a part of ELL programs. As the numbers of English language learners increase and schools' resources decrease, the need for collaboration becomes more evident (Van Loenen & Haley, 1994). Schools no longer have the resources to run separate programs for special groups of students. Collaboration is now necessary for enhancing resource utilization and program cost effectiveness.

According to Clegg (1996) the shift towards mainstreaming and collaboration with English language learners was motivated by our current understanding of the sociopolitical, psychological, academic and pedagogical needs of language minority students. When we look at all these needs, it seems that ELL and mainstream teachers can only meet these needs through mainstream education and team teaching efforts.

There are many advantages to working in collaboration. Students have become increasingly diverse in their needs and one teacher can not possible have the knowledge and skills necessary to meet the needs of all their students. Friend (as cited in Brownell, Walther-Thomas, 2002) states that, "Collaboration has become the primary contemporary strategy to foster innovation, create effective programs, and sustain them over time. In this day and age there is

simply too much for any one educator to know in order to effectively meet the needs of all his or her students" (p. 2). ELL teachers know how to integrate language development information with subject matter instruction and how to reduce the language demands of a task while maintaining a focus on the content of the lesson (Fradd, 1992; Van Loenen & Haley, 1994). There is tremendous pressure to ensure that all students achieve higher academic standards. Friend (as cited in Brownell, Walther-Thomas, 2002) believes that collaboration is not a luxury or option; it is a necessity if schools hope to meet the complex needs of all its students.

Pull-out programs in the teaching of ELL have been shown to not be effective if the curriculum is disconnected from the content of the mainstream. Collier (as cited in Gibbons, 2002) has demonstrated in studies that nonintegrated approaches--instruction in language alone--is usually insufficient to enable children to succeed in the mainstream (as cited in Gibbons, 2002). If children are following a separate ELL program, there is the risk that there will be little relationship between the language being presented and the language required for children to access and participate in curriculum learning (Davidson and Williams, 2001; Gibbons, 2002; Van Loenen & Haley, 1994). Clegg (1996) points out a paradox of some pullout programs. The pull-out program uses sheltered language to recreate a version of the mainstream. Why go to the trouble of recreating the mainstream classroom when the real thing is available next door? He makes the point, however, that a structured language program of

limited duration may be necessary to meet needs which cannot be addressed in the mainstream classroom. Urzua makes the case that if we are to truly make education for minority children not just equal but possessing quality we all--first language, mainstream, as well as second language teachers--must know what the others are doing (as cited in Enright & McCloskey, 1985). In pull-out programs, it has been a common practice for ELL teachers and classroom teachers to have little or no communication.

English language learners belong in the mainstream with language instruction integrated into the curriculum. Davidson and Williams (2001) claim that based on studies that were done in Australia, an English speaking immigrant country, an ELL curriculum based on language alone appears inadequate in view of contemporary understandings of the nature of ELL learning. But, curriculum based solely on mainstream content can fail to develop fully the linguistic skills of the students for whom it was intended. Gibbons (2002) points out that good content teaching is not necessarily good language teaching. Curriculum topics must have both subject and specific language aims. Only then can the curriculum provide an authentic context for meaningful and purposeful language use. The students' mainstream classrooms must therefore aim to integrate language and content so that the second language is developed along with new curriculum knowledge. Students in these kinds of classrooms make the transition from their own language to English without pressure from teachers to do so (Garcia, 1991). Given the language-rich child centered quality of

kindergarten and the primary grades there seems to be little doubt that especially in the early grades, the mainstream classroom seems to be the best place to do this (Clegg, 1996). It can take five to seven years for English language learners to match their English-speaking peers in the use of academic registers.

Teaching language and subject matter together, speeds up this process which makes the children's classroom time as useful as possible (Davidson & Williams, 2001; Gibbons, 2002).

The main need which sets English language learners apart from their language majority peers in school is that they have two jobs: they are learning both the curriculum and the medium of instruction, which is English. The idea of mainstreaming recognizes the broader educational purpose of school. English language learners are in school for their cognitive, academic and curricular development. To achieve these ends, they need to learn English (Clegg, 1996). Snow, Met and Genesse (1992) suggest that a rationale behind integrating language and content teaching is that language is learned most effectively for communication in meaningful, purposeful social and academic contexts and the mainstream classroom provides this opportunity. Schools need to meet the needs of all the students all day, and collaboration between the mainstream and ELL teacher is necessary to accomplish that goal.

I have taught in a situation where the classroom teachers wanted the ELL teacher to be solely responsible for the English language learners and their learning. Minority children often are seen to be the responsibility not of the whole

school, but only of language teachers (Clegg, 1996). Mainstream teachers need to be just as responsible for ELL student learning as the ELL teachers are. They have an essential role to play in the education of English language learners (Hamayan, 1990). Separating the English language learners removes the mainstream teacher from the responsibility for the education of a group of children. English language learners are a whole school responsibility, as are all students.

The purpose of collaboration in schools is to allow educators to combine strengths in new ways to accomplish more for students (Adams & Cessna, 1991). Classroom teachers have a wealth of experiences in teaching content. They can share strategies and techniques as well as the content of their instruction with ELL teachers (Hamayan, 1990). Many mainstream teachers do not have the strategies they need to work with ELL learners. By working collaboratively with an ELL teacher, they learn ELL techniques (Clegg, 1996). Garmston and Wellman (1998) emphatically state that developing a staff's capacities for talking together professionally may be the single most significant investment faculties can make for student learning.

Mainstreaming English language learners benefits the school. Anderson and Speck (1998) say that according to the literature, there are three ways in which team teaching helps students learn. First, students gain multiple perspectives because two teachers offer different viewpoints. Second, it promotes dialogue that leads to increased student participation. Third, teaching

and collaboration offers students the opportunity for getting different teachers' perspectives on grading, their learning styles, or getting feedback to solve problems. When we mainstream English language learners, all students benefit from a culturally and linguistically diverse classroom and a culturally inclusive and language-aware curriculum (Gibbons, 2002; Clegg, 1996). All children need to find their language and culture reflected in the curriculum and their surroundings. Sakash and Rodriguez-Brown (1995) state that creating collaboration between mainstream and ELL teachers is a partnership that can result in a shared commitment to systemic school reform, which leads to higher achievement and greater multicultural understanding in our schools. Learning to collaborate increases the learning opportunities for administrators, teachers and students (Fradd, 1992).

Mainstreaming students while teachers work in collaboration benefits the English language learners. In a pull-out model of ELL, students have to handle the demands of two different classroom settings, approaches and teachers. Mainstreaming these students gives them a more congruent instructional program whose emphasis is on helping student achieve success in the classroom (Bean, et al., 1999). Clegg (1996) points out that what distinguishes students within the ELL category is often greater than what distinguishes them from native speakers. We should see English language learners as full members of the school community, who have specific learning needs, rather than as a

separate group who must prove themselves linguistically before they can claim their full entitlement. This can only be done in the mainstream classroom.

Mainstreaming students while teachers work in collaboration benefits the teachers. Buckley (2000) states that teamwork improves the quality of teaching as teachers approach the same topic from different angles and areas of expertise. Teachers benefit from collaboration because they are able to meet the learning needs of students by reducing teacher/student ratios, they learn new ideas from their colleague about instruction and classroom management, and they have another adult in the classroom to share experiences and emotions generated by those experiences (Bean, et al. 1999; Salend, Gordon, & Lopez-Vona, 2002). Salend, Gordon, and Lopez-Vona (2002) found that members of cooperative teaching teams report that working cooperatively can make teaching more enjoyable and successful. Teaming benefits them by allowing them to try out new techniques. Why should ELL teachers collaborate? Riley (2001) received this comment from a teacher, "When you team with someone else, you have that check of approval from someone, the sort of checks and balances of it all. It gives me confidence in what I'm doing because I've shared" (p. 14).

Learning Language through Content

Children need to learn language as a medium of communication rather than as a curriculum subject with sets of isolated topics and through purposeful interaction with the second language (L2) environment (Enright & McCloskey, 1985). In order to do this, there are two sets of information that form the basis for

the planning of a program that integrates second language learning and curriculum learning. They are the responses to the two questions: 1) What are the language demands of the curriculum? 2) What do the children currently know about language, and what are their language learning needs? (Gibbons, 2002). The first question requires "finding the language" in the content areas (such as mathematics) that children are studying. The second requires finding out about children's current language abilities.

Cummins suggests that there are three interrelated areas critical to a pedagogy, which promotes second language learners' linguistic and cognitive development and the growth of critical literacy skills that are necessary for English language learners to learn language through content. 1) A focus on meaning; This requires input or the language that the children listen to or read to be comprehensible. 2) A focus on language; This includes the development of children's awareness of language forms and uses and the ability to critically analyze these. 3) A focus on use; This involves using language to transform what has been learned, through generating new knowledge (as cited in Gibbons, 2002).

There are many components an observer should see in a classroom of linguistically and culturally diverse students. Communicative classrooms are filled with pictures and posters (realia and concrete referents) (Enright & McCloskey, 1985). The instruction respects and builds on the students' home language and culture (Garcia, 1991). Students are active participants in a

linguistic environment because their language development is an interactive process (Enright & McCloskey, 1985). English language learners are constantly engaged in meaningful activities. Students work together to solve problems. The ELL hears and participates in conversation that is meaningful because the context makes the meaning clear. The students' second language, like the first, develops globally, not linearly so that in these classrooms, communication between teacher and students is emphasized more than in a regular classroom (Rigg & Allen, 1989).

A high, noisy level of communication characterizes classrooms with linguistically diverse students. Students need opportunities to work collaboratively in small groups. Large group instruction is rare (Brenner, 1994; Garcia, 1991). Students need to be placed in groups in order to achieve at their maximum potential. Hamayan (1990) emphasizes that the research on groups shows that grouping students by ability does not help in their academic achievement but that cooperative grouping among heterogeneous groups of students has been shown to be an effective classroom management technique that promotes learning. In heterogeneous cooperative grouping, students of different levels are assigned roles in which they work interdependently on a specific task given by the teacher. Urzua says that studies show that hooking up English language learners with buddies in a mainstream class who are more proficient in English than they are is a guaranteed language acquisition environment (as cited in Enright & McCloskey, 1985).

Teaching Language through Mathematics

There is a mistaken belief that mathematics is a universal language or entails minimal language use (Brenner, 1994). Mathematics is language and it has a vocabulary all its own (Krussel, 1998). There is a myth that students do not need much English proficiency to do mathematics problems. The opposite is true. Subjects such as mathematics continue to be ignored as crucial language areas (Tevebaugh, 1998). Buchanan and Helman (1993) tell us that increased language comprehension and proficiency are essential if English language learners are to achieve the level of mathematics literacy envisioned by the National Council of Teachers of Mathematics (NCTM) Standards documents (as cited in Tevebaugh, 1998). Limited English proficiency is a big obstacle to learning mathematics. English language learners who are reasonably fluent in conversational English may still have little command of the language of mathematics. Problems described in sentences and story problems create a major obstacle for English language learners (Kimball, 1990). Bullock (1994) says that if mathematics consisted only of new words and symbols, it could probably be considered as an extension of existing language. The reason mathematics is a new and separate language is that it also has its own syntax and grammar (as cited in Krussel, 1998). An example of this is the mathematical syntax and grammar rules embedded in rules for the order of operations in algebra. All students should be expected to learn the language of mathematics. In St. Paul, the *Everyday Math* series is much more language based than

previous math series. This makes integrating language with math content even more crucial.

Mathematics teachers need to adjust their teaching methods to be more comprehensible to English language learners (Tevebaugh, 1998). Brenner (1994) has found that traditionally the elementary school mathematics curriculum has focused on computational skills. The emphasis on mastery of basic skill prior to teaching conceptual or higher level thinking in mathematics has been ineffective for our students. Brenner states that in innovative classrooms, we do not see the sheltered English instruction of traditional mathematics instruction. A variety of teaching-learning arrangements have been found to increase student involvement with corresponding gains in student achievement. These instructional methods include peer collaboration, open-ended problem solving, open-ended large group discussion, and journal writing. These methods all require a higher level of language use than traditional mathematics instruction. Teachers and students will need to come to grip with the high level of language demand in teaching math to our English language learners if these students are to succeed.

Mathematics and Reading

Reading instruction is crucial to the comprehension of mathematics. According to Rubens, students instructed by a reading teacher who had little math skills were able to solve math word problems more efficiently than students instructed by a math teacher with little background in reading (as cited in Nolan,

1984.) General strategies which are helpful in developing the ability to read mathematics successfully are similar to the strategies which are used in other content areas (Nolan, 1984). Nolan has found these skills necessary to read mathematics: perceiving and decoding symbols; attaching literal meaning or concept development; interpreting literal meaning; applying these interpretations to the solution of word problems; and using specialized study skills. Fitzgerald (1995) also concludes that strategies necessary to teach reading as a second language do not differ from those used in teaching in a first language. This statement means that the skills needed to learn mathematics (a language) may not differ greatly from those required to learn any other language (as cited in Krussel, 1998).

There are many areas that make the reading of mathematics difficult. Nolan (1984) identifies some of these areas: the text uses a terse, unimaginative style and requires a slow, deliberate reading in order to comprehend the concepts; there are few content clues to help in decoding meaning; the mathematical symbols do not express typical phoneme-grapheme relationships and must be memorized; and a variety of eye movements are required to read material in addition to left to right movements (circular, top to bottom, bottom to top, diagonal). Nolan has also found that math presents specific reading problems in the area of vocabulary and word problems. Researchers have shown several strong links between reading skill, knowledge of math vocabulary and problem solving ability. Teaching math vocabulary led to improved scores in

vocabulary and problem solving (Skrypa, as cited in Nolan, 1984). Spanos and Crandall (1990) have identified four areas which give English language learners problems: 1) *Semantic difficulties*--technical vocabulary, words with different meanings, complex strings of words or phrases, the use of synonymous words (add, plus, and, combine, same), new symbols and mathematical notation, and differences between similar terms (less, less than); 2) *Syntactic features*--the use of comparatives (greater than/less than), the use of prepositions, generally in the use of *by*, and reversal errors where students are misled by the surface structure; 3) *Identifying the referent* (five times a number is two more than four times the number); and 4) *Pragmatics*--students have difficulty because of restricted knowledge or experience with concepts central to word problems. These issues must be addressed in the mathematics classroom if our second language learners are going to be successful in mastering mathematical concepts.

Teaching Mathematics to English Language Learners

Teachers need to have some understanding of English language learners if they want to increase their students' chances of being successful in the mathematics classroom. This is where having an ELL teacher co-teach with a classroom teacher can benefit everyone. When a topic is selected to teach, both the math and language objectives need to be addressed. For example, if addition is being taught, the ELL teacher can teach the language needed--*plus, sum, in addition to*--while the math teacher teaches the problem-solving skills needed to work through the problems using these terms (Spanos & Crandall,

1990). Teachers must set up the environment of the classroom so that the serious engagement in mathematical thinking is the norm (Ball, 1991).

Kimball (1990) has identified techniques teachers can use in their classrooms when working with English language learners that have worked for her. These include never assuming English language learners already understand mathematical terms, checking to see if the students comprehend both mathematical concepts and English meaning, and occasionally eliciting rapid *yes-no* or multiple choice responses instead of time consuming English responses. (*Is one-fifth greater than or less than twenty-five percent?*) This way comprehension can be checked more often. Kimball makes these additional suggestions. English language learners should not be expected to do the same quality of work. Adjustments need to be made for the English proficiencies of the students. Students with good English skills can be used to help decipher word problems. A buddy can act as an interpreter. We can gain insight into our students' thinking. Process should be stressed, not answers. Some wrong answers can be produced by simple errors, whereas others represent well-developed concepts or ways of thinking. (Ball, 1991).

A much wider range of instructional methods are needed to teach second language learners one of which includes peer collaboration (Krussel, 1998). In peer collaboration, the students are doing their own thinking. The National Council of Teachers of Mathematics (1989) states that emphasizing communication in a mathematics classroom helps shift the classroom from an

environment in which students are totally dependent on the teacher to one in which students assume more responsibility for validating their own thinking (as cited in Brenner, 1994). According to Shelly Jones, assistant director of Project to Increase Mastery of Mathematics and Science (PIMMS) at Wesleyan University, classroom discussion plays a big part in how math is changing. Students need to learn the procedure, but they also have to know why (as cited in Allen, 2003). Garcia (1991) says that instruction needs to be made up of active, rather than passive endeavors. Small group projects that allow flexibility in their participation allow this to happen while meeting the needs and abilities of a diverse group of children. The presenters of a workshop I attended entitled *The Power of Language: Math Strategies for ELLs*, the presenters suggested that guided math groups, as used in reading, can be used to individualize instruction. This is a good way to focus on language skills, including missing background knowledge in story problems. Guided math groups can be used as often as once or twice a week. Groups are flexible, with students moving from group to group as necessary. Games played in small groups are another way that math concepts are reinforced along with language patterns. Teachers need to address which language patterns the game reinforces and what the level of linguistic sophistication is required of the players.

Teachers need to make accommodations in their teaching in order to make mathematics comprehensible to their students. Sasser and Winninam (1994) suggest using sheltered methodology, which emphasizes the concept of

comprehensible input--making concepts understood by the learner. This can be accomplished by using real objects and materials (realia), manipulatives (rods, attribute blocks, geoboards), visuals/textbook illustrations, and graphic organizers (matrices, Venn diagrams, semantic maps, and webs). Dan Dolan, director of PIMMS says that in order to reach all students, teachers must learn how to use manipulatives and visual aides, which can embed the learning of math concepts in students' minds (as cited in Allen, 2003). Kottler suggests that acting, singing, and dancing can even be used as multisensory activities in mathematics to engage the students in learning (as cited in Tevebaugh, 1998).

A curriculum that prepares English language learners for mathematics must be vocabulary intensive. Learning math vocabulary for English language learners is especially difficult and skill instruction is needed in this area (Brenner, 1994; Kimball, 1990; Kottler, 1994; Riley & Pachtman as cited in Nolan, 1984). There are four different types of vocabulary. First, there are words that have the same meaning as they do in general usage but have a more precise or restricted meaning (for example, the word *steeper* in describing lines on a graph); secondly there are technical words which are peculiar to math (like *coefficient* and *polynomial*); then there are symbolic vocabulary ($a + b$), and lastly, words with multiple meanings (those words that have one meaning in general usage and a different meaning in math--*root*, *property*, *base*, *square*). Sasser and Winninham (1994) suggest collecting math vocabulary and gathering the words around the different math functions they are asked to perform. In this way the students can

develop a generous vocabulary of words they can use to decipher math texts. Students can keep vocabulary notebooks. Having English language learners work with native speakers to rewrite problems can enhance mathematical registers (Brenner, 1994).

In teaching mathematics to English language learners, incorporating writing into the curriculum has been found to be successful in increasing student achievement. Writing requires a higher level of language use than traditional mathematics instruction. Math journal writing has been found to increase student achievement in mathematics (Brenner, 1994). Students can write word problems about real life situations (making the situation authentic) in which mathematics can be applied. For example, Latina students can plan budgets for the *quinceaneras*, the celebration of girl's fifteenth birthday (Brenner, 1994 Franklin, 2003). According to the presenters of *The Power of Language: Math Strategies for ELLs* workshop, there are several different types of writing that can be used in language-based mathematics: writing that tells how (explain, describe, how); writing that tells why (explain, why); writing that predicts (If... what?); writing that conjectures (guess); opinion writing (What do you think?); comparison writing (which); and writing that summarizes.

Word problems pose a special problem for English language learners and they need to be made comprehensible for English language learners. Word problems use synonyms rather than words actually used in formulas (e.g., *rate* instead of *speed*). Information is presented in the problem in a different order

from that used in the formula. The information given can be insufficient or extraneous (Singer and Donlon as cited in Nolan, 1984). Brenner (1994) and Cohen and Stover (as cited in Nolan, 1984) suggest that children rewrite word problems to make them easier to solve. Strategies such as simplifying the wording, reducing the sentence length, changing the order in which information is presented to mimic the use of information in the formula, adding diagrams or patterning the word problem after their own language can be used. Fitzgerald (1995) says that by having students explain in their own words both in speaking and writing what they have just read is a strategy which has been used successfully in ELL instruction (as cited in Krussel, 1998).

Conclusion

The research unequivocally supports the notion that the needs of English language learners are most effectively met when classroom and ELL teachers work together to plan their instruction in the mainstream classroom. The mainstream is the best place for children to learn language. English language learners belong in the mainstream with language instruction integrated into the curriculum.

There has been a misconception that English language learners do just fine in mathematics and that they do not need much English proficiency to do mathematical problems. The opposite is true. Mathematics has a language of its own with its own vocabulary, syntax and grammar.

Mathematics can be most effectively taught to English language learners with a classroom teacher and an ELL teacher co-teaching. The ELL teacher makes sure that the language needs are being met in the instruction while the classroom teacher makes sure that the content is being covered. Both teachers should provide opportunities for the students to use the academic language through such activities as group problem solving, writing essays in mathematics or orally explaining a problem before actually solving it (Spanos & Crandall, 1990).

Spanos and Crandall (1990) have summarized the teaching methods that have been found to be most helpful to English language learners in coping with to academic language demands of mathematics: integrate language and content instruction; provide a variety of learning tasks with different formats and registers; increase peer interaction and cooperative learning; encourage students to use language productively in oral tasks; relate new learning to students' experience; and introduce authentic texts.

Chapter Three of my paper will explain the use of a case study order to answer my question, "How do successfully collaborating mainstream mathematics and ELL teachers work together (co-teach) while addressing the language needs of their English language learners in a mathematics classroom?" The teachers, school setting and classroom will be described. I will discuss how I carried out the case study and identify the elicitation techniques that I used.

CHAPTER THREE: METHODS

Introduction

The research tells us students' needs are best met when teachers work in collaboration (Clegg, 1996; Collier as cited in Gibbons, 2002; Davidson & Williams, 2001; Fradd, 1992; Friend as cited in Brownell & Walther-Thomas, 2002; Van Loenen & Haley, 1994). English language learners acquire language best when they learn language and subject matter together. The mainstream classroom can offer the greatest opportunity for meaningful and effective communication for second language learners in which to learn language. Now that I have a clearer understanding of what collaboration is and what the language needs of our English language learners are in mathematics, I wanted to observe, record and evaluate the practices used by successful collaborating ELL and mainstream teachers in a mathematics classroom.

Mathematics often is ignored in ELL collaborative settings. It is assumed that English language learners should be successful in math if they can do the computations. Research tells us that math language is often ignored. My goal was to understand how collaborating ELL and mainstream teachers meet the language needs of their second language learners in a mathematics classroom.

In this chapter I will describe the case study method I used to research one team consisting of a mainstream classroom and ELL teacher during mathematics instruction. The school setting, the classroom and the teachers I observed will also be described.

Rational for Case Study

The method I have chosen for this project is a qualitative case study. In doing such a study the researcher seeks greater understanding of the case; in my project, the case is the mainstream classroom. Qualitative study is holistic, empirical, interpretive, and empathic (Stake, 1995). A case study design is used to gain in-depth understanding of a situation. Insights gained from case studies can directly influence practice (Merriam, 1998). I chose a case study approach as my method of collecting data because this type of analysis allowed me to examine events as they occur in a mathematics classroom and team-planning meetings. I was able to observe, record, interpret and present information on the practices and behaviors I observed of collaborating teachers and students in a mainstream mathematics classroom. I was then able evaluate effective practices that I can now incorporate into my own teaching in order to better meet the needs of my students.

Selecting the Mathematics Classroom/Team

I talked to the Language Academy resource teacher for St. Paul Public Schools. She gave me the names of two Language Academy (ELL) teachers at two different schools whom she said were co-teaching effectively with

mainstream teachers in mathematics. She based her evaluations of their programs on her experiences with the teachers involved and on her observations in their classrooms.

I contacted the teaching team of "Ms. Johnson", classroom teacher, and "Ms. Michaels," Language Academy teacher, at "New Haven Elementary School" and they agreed to be observed for my project. This team had been recommended because New Haven has always made collaboration a high priority and the staff has worked to align its regular education curricula with ELL learning needs.

Ms. Michaels has high enthusiasm and a commitment to making the instruction work for English language learners. Ms. Johnson has taught both ELL and regular education. Her ELL experience has included several years as a TESOL teacher, so she has an understanding of the learning needs of English language learners from the beginning stages. The resource teacher thought that it was important that, as a school, New Haven had embraced working collaboratively and has received school administrative (principal) support. For three years they have been part of the STELLAR (St. Paul English Language Learners Academic Reform Model) grant program which has put resources into supporting collaboration as an integral part of ELL instruction.

The School

New Haven Elementary School in St. Paul is a small neighborhood school in the southwest area of the city. There are approximately 270 students enrolled in grades kindergarten through six. Seventy-five percent of the students have a second language. There are sixteen languages spoken at the school. In addition to providing ELL services to the second language students, New Haven has a bilingual (Spanish/English) kindergarten, first, second and third grade program which helps students build skills in their native language while they prepare to learn English. They also have Language Academy, which serves Level 1 English language learners.

New Haven has been part of the STELLAR grant program. STELLAR is a school reform model that focuses on making schools in St. Paul work better for English language learners. The district provides a facilitator for the STELLAR program at New Haven. This teacher gives support to Ms. Michaels, who, in addition to being a Language Academy teacher, is also the school site facilitator. The district facilitator acts as a liaison between the ELL department and the STELLAR schools. This is the third year that STELLAR has been at New Haven. Funding from the STELLAR grant provides monies for the following: a district level model facilitator, a site bilingual educational assistant, a staff development budget, a budget for books and materials which support the language arts and content area curricula, a technology budget, and a field trip budget.

Participants

I did my case study in a second-grade classroom. There were twenty-three students in the class, fourteen of whom were English language learners. The number of students who have the following first languages include Amharic (4), Swahili (1), Vietnamese (2), Spanish (3), German (1), and Hmong (3). Seven of the English language learners were in Language Academy. The Language Academy students were part of the mainstream classroom. Ms. Johnson had the support of Ms. Michaels in the morning and for another half-hour in the afternoon.

The Setting

The math lessons took place in Ms. Johnson's classroom. She had her desk in the front of the room. She had the students' desks arranged in groups of four or six. In the back half of the room, there was a large carpeted area that was separated from the rest of the room by bookshelves on three sides. The math lessons took place on this carpeted part of the room. The students sat on it either directly in front of Ms. Johnson, who was sitting in a chair, or in a circle in front of her. There was a white board next to Ms. Johnson. Ms. Michaels stood next to the white board during the lessons.

Setting up the Observations

I met with Ms. Michaels and Ms. Johnson after school one day in November. We discussed the time of my visits, the lengths of my visits and the goals of my visits. I had the teachers sign a teacher consent letter in which they agreed to participate in the study (see Appendix A). In addition to observing in their classroom, I also wanted to observe one or two of their team planning meetings.

We decided that there would be no audiotaping and I would start my data collection in January. The class would be starting the geometry unit at that time. Because I was observing the teachers and their methods, and not the students, I would be sending a passive consent procedure (see Appendix B) with each student emphasizing that my focus would be on observing the teachers. I gave each of the teachers a short survey of questions to answer (see Appendix C). It asked questions about their teaching experience and their experiences with collaboration and co-teaching.

The Teachers

Ms. Johnson has taught for eighteen years. She taught TESOL for thirteen years and has been a second-grade teacher for five years. This is her second year of co-teaching with Ms. Michaels in Language Academy. When she taught TESOL, she did some teaming with the first and second grade classroom teachers in order to integrate her students with the mainstream. Ms. Johnson also worked with educational assistants during her years as a TESOL teacher. She has attended district collaboration inservices in addition to receiving Language Academy collaboration training.

Ms. Michaels has taught for fifteen years. She taught acting for two years before she began teaching TESOL. She taught TESOL for seven years until the district changed the teaching model for beginning language learners to Language Academy. She has taught Language Academy for six years. While teaching TESOL, Ms. Michaels worked with educational assistants, aides, and student

teachers. Ms. Michaels said, "I always treated my aides and student teachers like co-teachers. I trained them so that they could work independently with the students." As a Language Academy teacher, she has collaborated with classroom teachers for six years. This is her second year collaborating with Ms. Johnson. Ms. Michaels has also attended district collaboration inservices and Language Academy training.

Implementing the Case Study

I conducted a case study. My research tools were the interview questions I asked before I started my data collection, an informal survey I gave to the teachers about their teaching experience and their experiences with collaboration (see Appendix C), observation questions I asked the teachers as I carried out the data collection, final interview questions (see Appendix D) and an observation log.

I collected data from the observations I made of the teachers and students in the mathematics classroom of Ms. Johnson and Ms. Michaels. I was an observer in the classroom. I sat a short distance from the class as I observed them. I collected data seven times over a four-week period during the teaching of the geometry unit. During the first four observations I tried to record verbatim the transcription of the lesson by recording the teachers and students words. I also noted the actions of the teachers and students. During the next three observations, I recorded the lessons with more general notes and I watched the teachers more closely, especially Ms. Michaels as she uses a lot of body

movement and facial expressions in her teaching. I was missing some of that when I tried to record the lesson verbatim. I observed and took notes on the roles Ms. Johnson and Ms. Michaels took during the lesson. I also observed the strategies the teachers used in teaching language to their English language learners, i. e., how they scaffold language and learning.

I also observed the teachers during a team-planning meeting. During that meeting I observed the role each teacher took and how they decided what to teach and how to carry it out. In particular, I wanted to find out how language issues were addressed.

I hoped that by observing an ELL and mainstream team teaching model, I would be able to observe and identify the factors that contribute to the success of their model and just as importantly, the strategies used to support the English language acquisition of their students. At the end of my observations, I talked with Ms. Johnson and Ms. Michaels individually to answer my unanswered questions that I had about their thoughts, attitudes, and experiences with ELL collaborative teaching.

When I finished my observations, I reviewed the data I had garnered through my survey results, transcripts, and interviews I had had with the teachers before, during, and after my observations. I organized my notes into three main categories based on my review of the literature on what makes collaboration and teaching mathematics between ELL and the mainstream most effective: practices and factors that make teaming work, teaching language through content, and

teaching language through math. I then divided these three categories further by describing which of these practices were taking place, and by describing the practices that I did not observe taking place.

Conclusion

I wanted to observe, record and evaluate what co-teaching mainstream and ELL teachers do to meet the language needs of their English language learners. I chose a case study as the method of analysis. A case study allowed me to gather data by making observations, interviewing the participants, and by keeping observation logs. I could then make interpretations about the data that I had collected in order to determine the practices that co-teaching teachers use to meet the needs of all their students. Chapter Four will contain the descriptions of these observations.

In Chapter Four, I will present the data I collected and analyze it using these categories: 1) practices and factors that make teaming work--practices I observed and what I did not observe, 2) learning language through content--practices I observed and what I did not observe, 3) teaching language through math--practices I observed and what I did not observe, and 4) how the Language Academy teacher scaffolds the language to make it comprehensible for the English language learners. Using my observations of Ms. Johnson and Ms. Michaels' classroom, I will describe and evaluate the collaboration and math instructional methods they used in their classroom.

CHAPTER FOUR: RESULTS

Introduction

In this chapter I will present the results of my research. First I will revisit the practices that make team teaching work and describe which of these practices I saw implemented in part Ms. Johnson and Ms. Michaels' classroom. I will then identify some things that I did not observe that research says are necessary for collaborative teams to work effectively. Secondly, I will reexamine how language is learned through content and identify examples that Ms. Johnson and Ms. Michaels demonstrated in their classroom. I will also identify some methods that I did not observe. Next, I will focus on some practices which have been effective in teaching mathematics to English language learners in the mainstream. I will describe which of these practices I saw that were a part of Ms. Johnson and Ms. Michaels' team and I will identify some factors that help make mathematics more comprehensible for English language learners that I either I did not observe or could be improved. Finally, I will discuss what skills Ms. Michaels, as the Language Academy teacher, contributed to make the math more comprehensible to all the students.

In my discussion, I will connect my observations to my question, "How do collaborating mainstream mathematics and ELL teachers work together co-

teach) while addressing the language needs of their English language learners in a mathematics classroom?"

I began my data collection on Monday, January 12, 2004. Math was taught from 10:15 a. m. until 11:15 a. m. The math class was starting a unit on geometry. The class began each day with the students gathered on the carpet in front of Ms. Johnson, the classroom teacher. She sat in a chair and she had a white board next to her. Ms. Michaels, the Language Academy (L.A.) teacher stood on the other side of the white board. Ms. Johnson did the teaching of the math concepts while Ms. Michaels reinforced the language. On the days I observed, the whole group lesson usually took most of the hour class. Ms. Johnson gave the students more time later in the day to work on their assignment. That was not included in my observation. On the first day, Ms. Michaels was gone so I observed Ms. Johnson teach the class. I was not aware that she would have a substitute teacher that day. I observed and took notes that day because I wanted to see what happened when the L. A. teacher was not there. I observed the class six more times over the next three weeks when Ms. Michaels was present. My role was that of an observer. I sat apart from the class and I did not participate in the activities. I also observed a team planning meeting between Ms. Johnson and Ms. Michaels on the last day of my classroom observations.

Results

Practices and Factors that make Team Teaching Work

According to the research, there are some major factors that come into play in schools that achieve success in teaming. First, these schools have a supportive involved principal and a supportive structure already in place at the school. Second, the teachers have had training in collaboration models and methods, and on building skills in group dynamics, problem solving and team building. Third, to be the most effective, teachers need to implement the four elements that make up effective collaboration: planning; implementation (co-teaching); assessment and evaluation; and reflection. In co-teaching models of collaboration, teachers combine their strengths. Fourth, they are better able to meet the needs of their students because the teacher/student ratios have been lowered. Fifth, the team members must be able to communicate their ideas and feelings. Sixth, in rooms with English language learners, there is an acceptance of the diversity present in the classroom. Finally, when teachers work in collaboration, it benefits the English language learners. In the next two sections of my paper I will describe how these practices were implemented in Ms. Johnson and Ms. Michaels' classroom. I will also identify those that I did not see when I observed in the classroom.

Practices and Factors that make Teaming Work: Things I Observed

One of the most important factors in making collaboration work is the school principal. It is hard for a collaboration model to be effective without the support of the principal. Ms. Johnson and Ms. Michaels both felt that they have had

principal support in the past. They said that the previous principal made sure that they got what they needed in regards to their programs. This included having adequate teacher support, aide support, teaching spaces and materials, having time for planning. This year New Haven has a new principal. As the principal becomes more familiar with the work in collaboration being done at New Haven between ELL and the mainstream, she should be able to maintain high levels of support for collaborative instructional programs.

Programs that are successful with collaboration have school support. Both Ms. Michaels and Ms. Johnson felt that they had the support of the school. The school has benefited from being a recipient of the STELLAR grant, which focuses energies and resources into supporting collaboration as an integral part of ELL instruction. Because of the grant, collaborating teachers get two days a year to plan together and they get a day at each conference time to work together on assessing their students, for a total of four days. The grant also provides for a coach, who acts as a resource for the teachers who are working on collaboration. As the mainstream teacher said, "We all have collaboration on our minds."

Effective collaborating teachers have had training in collaboration. Both Ms. Michaels and Ms. Johnson have attended district training in ELL/Mainstream collaboration in previous years. This training provides four days of training during a school year. It covers topics such as the elements of collaboration, models of collaboration and ways to enhance effective communication. Teachers are given half days to plan together during these training days. Also, because they are part

of Language Academy, Ms. Johnson and Ms. Michaels attend inservices each year to help them with strategies on how to accomplish effective integration of language instruction within content instruction in the mainstream classroom. As part of this Language Academy training, teams of teachers are able to observe each other during the year. Ms. Michaels and Ms. Johnson have found that these trainings have helped them learn better strategies for collaborating.

The purpose of collaboration in schools is to allow educators to combine their strengths and Ms. Johnson and Ms. Michaels' teaching team does this. Ms. Johnson knows the math curriculum well. Ms. Michaels knows how to support language learning through content area teaching. The students benefited from the expertise of both teachers. Both teachers became responsible for all students.

Collaboration works for both the teachers and students because the teachers are able to meet the learning needs of students by reducing teacher/student ratios. Two teachers were available for 23 students instead of just one teacher. When there was time, Ms. Michaels pulled a small group of English language learners to work on vocabulary or skills that they needed. This gave Ms. Johnson a smaller to group to work with. Both teachers stayed involved with the students. The time was not used for one of them to correct papers or do other things apart from the group.

In ELL collaborative settings with the mainstream, all children need to find their language and culture reflected in the curriculum and surroundings of their

classroom. With a teaming model, students spend most of the day in their mainstream classroom. I observed that the students were very accepting of the diversity in the classroom, which was evident during the first lesson I observed with Ms. Johnson teaching about attribute blocks. The following excerpt was taken from my first observation. The class was discovering the different attributes of the blocks.

T: Ms. Johnson S: Student Ss: Students

T: (She takes out a set of blocks.) Here's a different set of blocks.

Ss: Whoa! They're big!

T: What's another way we can sort?

S: How big it is.

T: Thick or thin. These are called attributes. What attributes do you have?

S: I'm this tall (He uses his hands).

T: That is your height. Another attribute besides height? (silence) (She calls on a different student.) Carlos, does he have the same color hair as you do?

Carlos: (Short hesitation) Hair is a different shade.

T: Color of hair is an attribute. What's something else?

S: Your skin color.

T: Right. Something else.

S: We come from different countries.

T: What else can we look at? (silence) Are your eyes all the same color or is the length of your hair the same? Or your kind of hair. Mary's hair is straight, others have curly hair. These are called attributes. Now we're going to look at the attributes of these blocks.

Mainstreaming students while teachers work in collaboration benefits the English language learners. Both Ms. Johnson and Ms. Michaels felt that teaming benefits their students. Ms. Johnson said, "I feel that by teaming, the students are being served more adequately. My students are succeeding because they are being given enough help and time." Each unit in *Everyday Math* includes a chart indicating the progress made by each student that teachers use for

evaluation. More students were able to achieve proficiency on the skills required for each unit because of the extra help students received from two teachers. Ms. Michaels said, "When I'm in the classroom, I always ask myself, how can I make this more comprehensible for my students? How can I differentiate the instruction? My students are able to learn the content while getting the ELL support that they need."

Practices and Factors that make Team Teaching Work: What I did not Observe

Successful team collaboration not only needs administrative support, but it depends on positive interactions between team members. Teachers need to be able to communicate their ideas and feelings. Research suggests that it can take a minimum of three years to build an effective team (Rutherford & Fullan as cited in McQuade, 1992). There are many positive things and going on in Ms. Johnson and Ms. Michaels' classroom, but there seems to be some issues concerning communication between the teachers. Ms. Michaels did not feel that Ms. Johnson treated her as an equal teaching partner. She felt that she was not allowed to take full responsibility for teaching the class and she would have liked to. The students saw the difference in their roles and she was not seen as "the teacher." This is the second year that Ms. Johnson and Ms. Michaels have teamed together and it may just take some more time for them to work out some communication issues. It seems that there may need to be a discussion about different models of collaboration so that Ms. Michaels is able to take on a more active teaching role.

Team planning time is important to make collaboration work. During team planning time teachers should discuss student needs, instructional plans and the language needs of the English language learners. They need to evaluate and reflect on their teaching. Ms. Johnson and Ms. Michaels try to plan 20-30 minutes a week together. They said that it does not always happen. I observed a 20-minute meeting. During the team-planning meeting that I observed, Ms. Johnson mostly informed Ms. Michaels about what material she would cover the following week. Ms. Michaels mostly listened. There was not much exchanging of information on subject matter or language issues. Also, 20 minutes (if it happens) is not enough time to effectively plan and evaluate their instruction. If more time was spent on planning, they could discuss how to use Ms. Michaels in more than a supportive role.

Finally, children should find their language and culture reflected in the surroundings of their classroom. I did not observe memorabilia or bulletin boards that reflected the diversity of Ms. Johnson's classroom at the time I observed in her room. The *Everyday Math* textbook does use ethnic names in its word problems. Ms. Johnson and Ms. Michaels addressed the diversity in the classroom when they taught, i. e., they talked about the different countries that students came from.

Teaching Language through Content

In the literature review, it was proposed that children need to learn language through authentic language experiences. Second, there needs to be a focus on

language in the classroom and language teaching needs to be incorporated into the content area instruction. Third, teachers in the classrooms of English language learners need to use lots of pictures, posters and realia. Fourth, the students need to be participants of a linguistic environment where they are given many opportunities to use language. Finally, the students need to be engaged in meaningful activities while working together in collaborative groups. Large group instruction should be limited. In the next two sections of my paper I will describe practices that focus on teaching language through content that were a part Ms. Johnson and Ms. Michaels' classroom. Then I will identify some things that I did not observe that research says are necessary for English language learners to learn language through content area subjects.

Teaching Language through Content: What I Observed

Children need to learn language through their content area subjects and language teaching needs to be incorporated into the instruction. Both Ms. Johnson and Ms. Michaels focused on language using many different strategies. Ms. Johnson explained the meanings of words and phrases as she taught. Then Ms. Michaels further reinforced the language of math. Ms. Johnson allowed her to "jump in" and "teach language" when it was necessary. Ms. Michaels wrote down words so that the students could see them as well as hear them. She talked about word meaning and gave different examples of the word. She had them repeat words so they could work on pronunciation. Ms. Michaels used graphic organizers when appropriate to illustrate how things are the same or

different in order to make concepts more comprehensible. She showed pictures and used realia when she was able.

The following excerpt is from my second day of observations. It illustrates how Ms. Johnson and Ms. Michaels incorporated language into the math lesson by focusing on vocabulary, using a graphic organizer and realia. The lesson is on the different features and characteristics that attribute blocks can have.

T: Ms. Johnson T2: Ms. Michaels S: Student Ss: Students

Ms. Michaels writes on the white board as Ms. Johnson teaches. She makes a chart and writes *shape* and underneath she writes *circle*, *triangle*, *rectangle*, and *square* with pictures by each; she writes color and underneath she writes *blue*, *red*, *yellow*, using the appropriate color; she writes size and she writes *small*, *big*. She also draws a Venn diagram.

T2: These are the different attributes we're using. Here's a Venn Diagram we can use it to compare them.

T: (Gives a big, red, rectangle to a student.) Tell me the attributes we're using. (silence) Juan, what is the size of your shape? (silence) Use this chart to help you. (Points to Ms. Michaels' chart.)

T: What are the attributes of your blocks?

Juan: Rectangle. It's red.

T2: And size?

Juan: Big.

T: (Gives a small, blue, square to another student.) Which of your attributes are different? You're going to tell color, size, shape. Tell me your attributes.

Grace: 4 sides. Blue. Thick.

T: Look on the chart. See if you missed an attribute.

Grace: It's small.

T: The things that are different are ...

Grace: Shape.

T: What other attribute?

Grace: Size.

T: So what attributes are the same?

Grace: Color and thickness.

Ms. Michaels has filled in the Venn Diagram to illustrate the differences and similarities of the two blocks.

T2: Can everyone say *attribute*?

Ss: Attribute.

Ms. Johnson then explains the pages that the class will do in their math journal. The first page is Math Boxes, a page of review. The first problem is a subtraction problem. Ms. Johnson begins to review. Ms. Michaels writes: *more +, less -*.

T2: Less is minus, plus is more or adding.

The next problem is a temperature problem. Ms. Michaels displays a thermometer. She points to Fahrenheit and Celsius on it as she says the words.

T2: Can everyone say degrees?

Ss: Degrees.

Ms. Johnson continues to explain the next page. Ms. Michaels writes key words and phrases on the white board: *size, shape, color, trace, color*, to help illustrate key words.

T: You will need to trace some shapes here.

S: What does trace mean?

Ms. Johnson demonstrates tracing a circle on the white board. Ms. Michaels writes *trace* on the board next to it. The students are instructed to go to their seats and they need to work with their partners.

The students should be participants in a linguistic environment because their language is an interactive process. One of the strategies that Ms. Michaels used frequently was to have the students talk with a partner about a question or concept if they were having trouble understanding it. The following excerpt was taken during my third day of observations. The class was talking about what characteristics make a figure a polygon.

T: Ms. Johnson

T2: Ms. Michaels

S: Student

T: Does anyone remember what a polygon is? What do you remember about polygons?

S: It's a shape.

S: It's the same if you divide it.

T: That's symmetry. We're going to draw some polygons. (Ms. Michaels draws some polygons on the board.) What is the same about all of these?

T2: Can they turn and talk to their partner about this? Turn to a partner and talk. (Students talk for a couple minutes.) All eyes up on the board. Raise your hand if you want to say something. (She calls on a student.)

S: They all have straight sides.

T: Good observation. What else? (Silence.) Let's draw a few things that aren't polygons. (She draws several shapes.) You can discuss with your partner what you're noticing. (Students talk.) Juan, what do you think a polygon is not?

Juan: A polygon is not a circle.

T: Right. What have we said a polygon has?

S: It has to have straight sides.

S: They have to be a closed shape.

T: What else? I'm looking at this one. (She is looking at a quadrilateral with an extended line on one side.)

T2: Talk to your partner about why this is not a polygon. (Students talk.) What do you think?

S: It looks like a *b*. It's not connected.

Students need to work together to solve problems. This happened in the large group when the students discussed a problem with a partner. Whenever they worked on their assignments at their seats, they worked in heterogeneous collaborative groups. These groups were made up of native English speakers and nonnative English speakers. Abilities were mixed by high-medium and medium-low. Talking with their partners was encouraged when the students worked on their assignments.

Teaching Language through Content: What I did not Observe

English language learners need to constantly be engaged in meaningful activities. They need many opportunities to work collaboratively in small groups. Large group instruction should be rare. In all the lessons I observed, almost the entire time was spent doing a large group lesson. The most time spent on partner work was about fifteen minutes out of an hour lesson. The large group lesson needed to be shorter so that the students could spend more time working in collaborative groups. By working in groups, students are given more opportunities to practice language. Students should be doing more of the talking.

Teaching Language Through Math

Mathematics is language and continues to be ignored as a crucial language area. Language instruction can not be ignored in the teaching of math. First, the specific vocabulary of mathematics needs to be taught, which can include idioms. Second, students need to be taught how to decipher word problems. Strategies, which are helpful in developing the ability to read mathematics successfully, are similar to the strategies used in teaching reading. Third, mathematics classrooms of linguistically diverse students need to be filled with pictures, posters, and other realia that illustrate mathematics. Fourth, English language learners need activities that are active, rather than passive, which includes the use of manipulatives. Fifth, students are better able to demonstrate competency in math when they are involved with peer collaborative groups. Finally, in teaching mathematics to English language learners, incorporating writing into the curriculum has been found to increase student achievement. In the next two sections of my paper I will describe practices that were a part Ms. Johnson and Ms. Michaels' classroom that demonstrate how they teach language through mathematics. Then I will identify some things that I did not observe that research says help English language learners to learn language through mathematics.

Teaching Language Through Math: What I Observed

The strategies that I have discussed that are used to teach language through content also apply to teaching language through math. I have already discussed how Ms. Johnson and Ms. Michaels incorporate language into their instruction,

use pictures and realia whenever possible, and how peer collaborative groups were used in their classroom. In this section of my paper, I will discuss strategies more specific to the teaching of mathematics.

Reading instruction is crucial to the comprehension of mathematics. Math presents specific reading problems in the area of vocabulary and word problems. Ms. Michaels supported the math lesson with her emphasis on vocabulary. If Ms. Johnson said a word that is new to the class, Ms. Michaels wrote it on the board, illustrated it if possible, and had the children repeat the word. The following excerpt comes from the end of my third observation. Ms. Johnson and Ms. Michaels were showing the class a resource page that has pictures of the different polygons that they have been discussing. It further illustrates how Ms. Michaels focused on mathematics vocabulary and its importance to understanding the lesson.

T: Ms. Johnson T2: Ms. Michaels S: Student Ss: Students

T: This page is a resource.

T2: Say *resource*. (She writes *resource* on the board.)

Ss: Resource.

T: A resource. We use our word bank as a resource. What is a resource?

S: It helps us.

T: That's right. This is a resource for polygons. We're going to be going back to this page 116 as a resource. (Ms. Michaels writes *116* on the board.)

T: (She points to the group of quadrilaterals.) These shapes are quadrilaterals. (Ms. Michaels writes *quad = 4* on the board.) Any shape with 4 sides is a quadrilateral. (She points to an odd shaped polygon.) Is this a polygon?

Ss: Yes.

T2: Let's look at it. It has straight sides. It's closed and no sides are sticking out. We're going to practice these words. (She points to each set of pictures as she says each word.) Triangle.

Ss: Triangle.

T2: Quadrilateral.

Ss: Quadrilateral.
 T2: Pentagon.
 Ss: Pentagon.
 T2: *Pent* means 5. Hexagon.
 Ss: Hexagon.
 T2: 6 sides. *Hex* means 6. Heptagon.
 Ss: Heptagon.
 T2: How many sides do you think a heptagon has?
 S: Seven.
 T2: Octagon.
 Ss: Octagon.
 T2: Eight sides. You need to learn these words.

You can never assume that English language learners understand mathematical terms, which have a very precise vocabulary. Ms. Michaels was constantly writing the meanings of words or illustrating terms. For *shape*, she wrote *circle*, *triangle*, and *rectangle* and *square*. She made a sketch by each one. When Ms. Johnson was explaining a problem that used the term *more*, Ms. Michaels wrote *more* with a + symbol next to it. When the term *less* was used, she wrote *less* with a - symbol next to it. She explained in words that *plus is adding*, *less is minus*. The following excerpt comes from my fourth day of observing. Ms. Johnson is teaching the mathematical term *point*.

T: Ms. Johnson T2: Ms. Michaels S: Student Ss: Students

T: We're going to talk about something else. Can someone tell me what a point is?
 T2: Everyone say *point*. (Writes *point*.)
 Ss: Point.
 T: Samuel, tell me what a point is. It can be a lot of things.
 Samuel: (Silence)
 T2: Turn and talk to a partner. (The students talk.) Stop and turn around.
 T: Samuel, can you tell me now?
 Samuel: Something that is sharp. (Ms. Michaels writes *sharp* on the board.)
 T: Lindsey, what do you think?
 Lindsey: Like the corner of a square.

T: OK. Dominic?

Dominic: A dot. (Ms. Michaels writes, *dot*.)

T: Evan? (Long silence.)

Evan: A pencil point.

T2: It's like a pencil point. (She draws a pencil and writes, *pencil point*.)

T: *Point* is a math word. (She draws a point on the board.) This is a point like Dominic said.

Ms. Johnson goes on in the lesson to teach the term *line segment*.

T: When we start making lines we need to be exact so we need a straight edge. (Ms. Michaels writes *straight edge*. Ms. Johnson shows in the Math Journal where it says, "Use a straight edge".) Does it have to be a ruler?

Ss: No.

T: You will usually use this straight edge (template) or a ruler. (She connects 2 points using her template.)

S: You connected them.

T: I connected 2 points using a line. Did I connect 2 dots?

Ss: No.

T: I made a line segment. (Ms. Michaels has written the words *point*, *straight edge*, *connected*, *line segment* and *template* and made a sketch by each word.) The line is much more exact by using the straight edge.

T2: (Holds up template.) This is a template.

T: It is a template that we can also use as a ruler.

Teaching the precise vocabulary of mathematics was a very integral part of Ms. Johnson and Ms. Michaels' lessons.

Idioms can pose a problem for English language learners. A Math Box problem was on doing ballpark estimates. Ms. Johnson began explaining the problem. The following excerpt was taken from that lesson:

T: Ms. Johnson T2: Ms. Michaels Ss: Students

T: The next problem is doing some ballpark estimates. (Ms. Michaels writes, *ballpark estimates* on the white board.)

T: This is another strategy.

Ms. Michaels writes *strategy* on the board and draws an arrow to *ballpark estimates*.

T: You have to round up or down to estimate.

T2: Everyone say *es-ti-mate*.

Ss: Es-ti-mate.

Ms. Johnson explains rounding numbers. She makes a numberline. Ms. Michaels draws arrows on the numberline and points as Ms. Johnson talks.

T2: Ballpark means that the number is kind of close. It's comparing it to baseball and hitting the ball inside the fence.

T: There are lots of sayings or expressions in every language.

T2: (Points to white board and the work they've been doing.) What is this all about?

Ss: Ballpark estimate.

Word problems and understanding written directions are especially difficult for English language learners. Each day Ms. Johnson would go over the Math Boxes, the review pages. These pages had six different types of problems the students had to solve after reading the directions for each one. During several of the lessons she emphasized, a reading strategy for doing each problem: *read it, do it, read it again*. Ms. Michaels would write these words on the board and the students would then say the words together. The students were making the connection between hearing, seeing and reading the words.

Second language learners need activities that are active, rather than passive. At the end of my first day of observations, the students played a game called "This Fits the Rule". In cooperative groups the students were given a tub of attribute blocks. Students would chose a specific set of attributes that they wanted their partners to guess. (Small, blue shapes, for example.) They would find a couple blocks with the attributes they had chosen and the rest of the group would have to guess what the attributes were. On my last day of observations, the class was making a "Shapes are Everywhere" bulletin board by cutting pictures out of magazines. These were appropriate "hands on" activities for

English language learners. Even though there were some hands-on experiences used during my observations, I thought that there needed to be more of these kinds of activities--active in nature with the use of manipulatives. There was too much time being spent in the large group.

Teaching Language Through Math: What I did not Observe

Too much class time was spent in a large group setting. Using guided math groups one or two days a week is a good way to focus on language skills, including missing background knowledge in story problems. Games are good tools to use with English language learners. They are actively involved with learning math concepts and language patterns are reinforced as students communicate with their classmates.

In teaching mathematics to English language learners, incorporating writing into the curriculum has been found to be successful in increasing student achievement. I did not observe writing being used with this geometry unit. Writing requires a higher level of language use than traditional mathematics instructions. There are several ways to incorporate writing into the curriculum. Journal writing is a tool that is often used. Students can rewrite problems to make them easier to solve by using strategies such as simplifying the wording or changing the order in which information is presented. The students can write word problems about real life situations, in which mathematics can be applied, thus making the situation authentic. Students can also keep a math vocabulary

notebook. As a resource for their writing, bulletin boards can be used for math word banks to help reinforce vocabulary.

How the Language Academy Teacher Reinforces Language

Ms. Johnson is aware of the language needs of her students, but her primary focus is on teaching math concepts. By having Ms. Michaels in the room with her students, not only is math being taught, but so is language.

Ms. Michaels, the Language Academy teacher, was absent during my first observation. I want to point out the contributions that she made in making the language and concepts more comprehensible to all the students and how she gave support and encouragement to the English language learners. Ms. Michaels may not be aware of all the contributions she made to the class. As an observer, I was able to see the difference she makes in reinforcing language. I was able to compare what happened in the classroom when she was not there to what happened when she was there. I was able to see how she reinforced vocabulary, taught with body movement, helped with the affective needs of the English language learners, and helped monitor the class.

Ms. Michaels really focused on the vocabulary as Ms. Johnson taught. She picked out words and terms that she felt that the students are not familiar with. She wrote words and illustrated them on the white board as Ms. Johnson taught so the students could get a visual picture of what Ms. Johnson was talking about. She also used realia when she can. If Ms. Johnson was talking about a thermometer, Ms. Michaels would get one to show the class. When Ms. Johnson

told the class they needed a template, Ms. Michaels held one up for them to see. She used any means available to demonstrate a concept. The following excerpt is from my sixth day of observations. They are discussing the meaning of *opposite*.

T: Ms. Johnson T2: Ms. Michaels Ss: Students

Ms. Johnson has drawn a quadrilateral on the board with one pair of parallel lines. She points to a line segment.

T: What is this?

Ss and T2: Line segment AB.

T: Name 2 sides that are opposite of each other. (Silence)

Ms. Michaels writes *opposite line* on the board and puts her hands opposite each other.

Ms. Johnson discusses the concept of opposite.

Ms. Michaels has a student stand up and she stands across from him. She points to herself and to the student, indicating that they are opposite each other.

Then Ms. Johnson discusses the concept of side by side.

Ms. Michaels stands next to the student. She points to herself and to the student, indicating how they are next to each other.

Ms. Michaels pats the boy on the back and has him sit down.

I observed other ways in which Ms. Michaels contributes. The following excerpt is from my fifth day of observations. Ms. Michaels used her entire body to teach. She used her fingers, hands and arms to demonstrate angles, parallel lines and line segments. It shows how she monitored the group and it gives an example of how affective needs of students are met. She made sure that the students were paying attention by giving them "a look" or by having them move so they could see. It also shows how she supported a shy English language learner. The discussion is on parallel lines and then it goes into discussing quadrilaterals and quadrangles.

T: Ms. Johnson T2: Ms. Michaels S: Student

Ms. Johnson draws 2 parallel lines on the board and 2 that aren't parallel and she asks the class what is different.

S: Those go in the same direction. (She points to one set. Then she points to the other set.) Those go in a different direction.

Ms. Michaels then labels the 2 sets of lines: *same direction, different direction*.

Ms. Johnson calls on a student for another difference. He does not respond and there is a long wait time (15-20 seconds). Ms. Michaels extends her arms and crosses them in front of her. She is also looking at a couple students that are obviously not paying attention. The students see her looking at them and they tune in.

T2: Are they apart or are they touching?

Students respond that they are touching and Ms. Michaels writes *will touch* under the lines that are not parallel. Another student is called on. Ms. Michaels puts her two index fingers together at the tips at an angle.

T: What if I keep going with the lines?

She calls on a student and she isn't able to respond. Ms. Michaels extends and crosses her arms in front of her. The student replies quietly with, *crossing*.

T: They will cross.

T2: Everyone say crossing.

Ms. Michaels writes *crossing* under the lines that are not parallel. She goes over to the student that responded and tells her that she did a good job and she pats her on the back.

Ms. Johnson talks about lines that never cross. Students don't know what they're called so she tells them.

Ms. Michaels writes *parallel* on the board.

T: If you continue them, they will never meet.

Ms. Michaels writes *continue*.

Ms. Johnson draws 2 shapes on the board and asks what a 4 sided shape is called. The students shout out answers.

Ms. Michaels shakes her head.

Ms. Johnson tells them that a 4-sided shape is a quadrilateral. She asks what the difference is between a quadrilateral and a quadrangle is.

Ms. Michaels writes the two words on the board and she circles *lateral* and *angle* to point out the difference.

T: What is a quadrangle?

Ms. Michaels puts her arms up in an angle. (No response.)

T: What is an angle?

Ms. Michaels moves her arms into several different angles. The students respond with *lines that come together*.

Three students join the group. Ms. Michaels motions to one to move so she can see.

Ms. Johnson talks about page 120 in their Math Journal.

T: It's about quadrangles and quadrilaterals.
 Ms. Michaels points to the words on the board.
 Ms. Johnson then asks what a parallelogram is.
 Ms. Michaels draws one. The students can't explain what a parallelogram is. She extends her arms out straight in front of her. Students begin to shout out answers. Ms. Michaels tells them that Ms. Johnson will call on them.
 Ms. Johnson draws a parallelogram on the board. She asks if the lines are parallel. The students are not getting it. Ms. Michaels raises her hand.
 T2: Who thinks they are parallel?
 The students eventually come up with *parallel line are lines that will never meet*. Ms. Michaels writes *parallel*. Ms. Johnson reviews the shapes found on p. 120. She draws a trapezoid. Ms. Michaels writes *trapezoid*. Then Ms. Johnson started to give instructions for p. 121. Ms. Michaels writes *p 121*. Ms. Johnson pointed to the vertex of the trapezoid and names it.
 T: Say it. (Some students respond.)
 T2: These students didn't respond. Say vertex. (The whole group responds.)
 T: The point of a corner is the vertex.
 Ms. Michaels taps the ends of her palms together, making an angle with them.
 T: The point where the lines come together. Say it. (A few respond.)
 T2: Only 10 said it. Let's say it again. (Everyone responds.)
 T: (Points to a line segment.) This is called....
 Ms. Michaels makes a line segment with her fingers. The students respond.

Ms. Michaels was constantly using her body. On the last day of my observations, the class was practicing counting by quarters. Ms. Michaels wrote .25, .50, .75, and \$1 on the board. The class started counting and Ms. Michaels turned it into a chant. She wrote 1.25, 1.50, 1.75 and \$2. Ms. Michaels started snapping her fingers as they counted and then she began swaying her body. The counting and chanting continued as Ms. Michaels snapped her fingers and swayed to the chant.

Ms. Michaels was very supportive of the English language learners. She would give them an encouraging look or a pat on the back if they needed it. Another strategy that I observed Ms. Michaels using with her Language Academy students was that if a student did not understand or could not answer, she would

say, "You can say pass." This enabled students to answer, but to get out of an uncomfortable situation.

Ms. Michaels provided another pair of eyes. She could help Ms. Johnson monitor the students. If students were not paying attention, Ms. Michaels would give students a look or say something quietly to get them to pay attention. She noticed when students were missing a concept and then she focused on that student by calling on them to try to help them understand.

Having Ms. Michaels in the classroom made a big difference in meeting the language needs of the English language learners. She was able to make the mathematics more comprehensible to the English language learners through sheltered instruction by using strategies such as teaching vocabulary through pictures, realia, and by using visual cues. Situations were made more comfortable for the English language learners because Ms. Michaels was sensitive to their needs. Monitoring the group was easier because she provided an extra pair of eyes. Ms. Michaels made Ms. Johnson's job of teaching math concepts to the English language learners possible.

Discussion

There is so much to do in teaching a diverse group of students that it takes two teachers. In Ms. Johnson and Ms. Michaels' classroom, Ms. Johnson took responsibility for teaching the math concepts and Ms. Michaels focused on the language needs of the students. Together they were trying to meet the needs of

all their students. The students were benefiting because they got the expertise of these two teachers. In this part of my paper, I will connect the observations to my research to my question "How do collaborating mainstream mathematics and ELL teachers work together (co-teach) while addressing the language needs of their English language learners in a mathematics classroom?"

There were many good things going on in Ms. Johnson and Ms. Michaels' math program. Both teachers felt that they had the support of the school with their collaboration model, and they had participated in district trainings in collaboration.

During my observations, the majority of the lesson was taught collaboratively by using the Major Teacher/Assisting model (one teach, one support), with Ms. Johnson being the lead teacher. Occasionally, Ms. Michaels would become more active in her teaching role at times and they would then be team teaching. Ms. Johnson taught the math curriculum and Ms. Michaels supported the language learning. They also used the Supportive Teaching model (pulling out a small group) when Ms. Michaels pulled a group of students from the class to focus on their needs. Ms. Johnson and Ms. Michaels tried to plan together each week. Ms. Michaels then knew what Ms. Johnson was going to cover so she could prepare herself for the language needs of the lessons.

Both Ms. Johnson and Ms. Michaels were aware of the language needs of their students. The students were given a "wait time" in answering questions when they needed it. Ms. Johnson explained the meanings of words and

phrases. During the lessons I observed she spent extra time explaining words, not only math terms like *polygon*, and *line segment* and *ballpark estimate*, but also other related words like *productive*, *exact*, and *thick*. The class had brought in 3D shapes and Ms. Johnson called it their "Art Museum". She said that they were going to see how the Art Museum was shaping up. Ms. Johnson went on to say that she had made a pun and she went on to explain what a pun is. Ms. Michaels reinforced the language even more. She really focused on vocabulary. She would point out words or phrases that Ms. Johnson may have overlooked. She wrote down words so that the students not only heard them, but saw them as well. Ms. Michaels had the students repeat words so they could work on their pronunciation skills.

Both Ms. Johnson and Ms. Michaels used different teaching tools so the students could not only hear, but also see what they were teaching. While Ms. Johnson taught, Ms. Michaels used graphic organizers when it was appropriate. She used a Venn diagram to illustrate the differences and similarities of the attributes of different shapes. Ms. Michaels used realia whenever possible. She held up a thermometer when Ms. Johnson talked about a temperature problem. When Ms. Johnson said the class needed to use their template, Ms. Michaels got one to show them. Ms. Michaels sketched objects as Ms. Johnson talked about them.

Reading instruction is crucial to the comprehension of mathematics. Ms. Johnson emphasized reading strategies to the students. There are a lot of

written instructions in the *Everyday Math* series. Ms. Johnson told the students that for every problem, they needed to *read it, do it, read it again*. She said they needed to use this strategy whenever they worked in their Math Journals.

The students were involved in some hands-on activities. They had to discover the different attributes of a bucket of attribute blocks while working in small groups. They had to look through magazines for pictures of shapes for their bulletin board of 2D and 3D shapes. They had to find examples of 3D shapes at home to bring to school for their Art Museum.

Ms. Michaels made sure that the students had opportunities to practice language during the math lessons. If there were a difficult concept being discussed in class, she would have the students talk with a partner about the question. Whenever students worked on assignments at their seats, they worked in heterogeneous collaborative groups.

Ms. Michaels did many additional things to help meet the language needs of the English language learners. By having two teachers in the room, they could monitor the class more easily. By providing an extra pair of eyes, Ms. Michaels could see who needed extra support. She helped lower the affective filters of the English language learners so that they could feel comfortable. If students needed a pat on the back, Ms. Michaels gave it to them. In addition to all this, Ms. Michaels is unique in her approach to making language comprehensible to her students. Ms. Michaels has an acting background. Because of this, she used many facial expressions and body movements to get points across to the

students. Her fingers, hands and arms were used to demonstrate shapes, angles, parallel lines and line segments. Facial expressions and nods let students know if they were "on the right track" or not. Ms. Michaels used her whole body to get concepts across such as *next to* or *opposite*.

Ms. Michaels, with her ELL background, supported Ms. Johnson in her teaching of math concepts by collaborating (co-teaching) with her and sheltering the mathematics instruction, so that the language needs of the English language learners were met.

In Chapter Five I will summarize what I have learned from my study. I will revisit the literature review, reflect on the study's implications for collaboration in St. Paul between ELL and the mainstream, discuss the limitations of the study and make some recommendations for the future.

CHAPTER FIVE: CONCLUSION

"Any group that is too busy to reflect about its work is too busy to improve. Without periodic and routine self-assessment, groups are doomed to do things exactly the way they have done them in the past..." (Garmston & Wellman, 2000, p. 63).

The question that guided me through the writing of this capstone was "How do collaborating mainstream and ELL teachers work together (co-teach) while

addressing the language needs of their English language learners in a mathematics classroom?" Last year I found myself in a position where I was told that I needed to collaborate in order to be effective as an ELL teacher, yet most of the classroom teachers that I had to work with, wanted no part of it. They wanted me to pull my students out of their rooms. This way they did not have to deal with having another teacher in the room or with my Language Academy students. In the school where I had previously taught, some of the ELL teachers refused to collaborate or co-teach with the mainstream because they said that it just did not work. I felt frustrated with the idea of collaboration and not knowing how to implement it. I needed to find out why the St. Paul ELL Department wanted me to collaborate and what it took to form an effective collaborative team. I wanted to observe how a collaborating ELL and mainstream teaching team address the language needs of their students in a mainstream classroom.

I began to study the literature on collaboration. It revealed that the English language learners' language needs are best met in the mainstream classroom and those teachers that are most effective, collaborate. I have always wanted to provide the best learning environment possible for my students. I needed to learn more about how collaboration could make me a better teacher.

In this chapter, I will review the literature researched, reflect on the study's implications, discuss the limitations of the study, make recommendations for the future, and summarize what I have learned,

The Research Reviewed

Very little research has been done on ELL and mainstream collaboration. Most studies of collaboration and co-teaching come from examples of inclusion from special education.

Collaboration is made up of four main elements: planning; implementing (co-teaching); assessment and evaluation; and reflection (Anderson & Speck, 1998; Duke & Bernal, 2002; 1995; Salend, et al., 2002). All four of these components need to be in place in order for collaboration to be effective. In my experiences with collaboration, the planning and even more so, the assessment pieces were missing. It seemed that this was the case with the experiences of many other ELL teachers. I began to wonder if there were ELL and mainstream teaching teams that truly collaborated in the way it is meant to be done.

As I began to read the research on collaboration, I came to understand that many times collaborative teams do not succeed because they never had the tools they needed that would enable them to be successful. They lacked the training and the knowledge about collaboration that would give them the understanding of how to make co-teaching work. Teaching teams also have to learn how to deal with the biggest obstacle of all in order to forming an effective collaborative team: the lack of time to plan and evaluate their curriculum (Bean, et al., 1999; Brownell & Walther-Thomas, 2002; McQuade, 1992). Ms. Johnson and Ms. Michaels found that because of the lack of time, their planning time was limited to only about twenty minutes per week, if it happened at all. I did not observe any evaluation of their program taking place.

The mainstream classroom is the best place for children to learn language. By being in the classroom, the children can see the relationship between the language being presented and the language required for them to participate in curriculum learning (Gibbons, 2002). This was demonstrated over and over in Ms. Johnson and Ms. Michaels' classroom. Math language was taught in the context that it was used. The language was integrated with the content so in which English was learned along with math knowledge.

Collaboration allows educators to combine their strengths in ways that enable them to accomplish more for their students (Adams & Cessna, 1991). Ms. Johnson and Ms. Michaels did this in their classroom. Ms. Johnson taught the content of the math while Ms. Michaels identified and taught the language needs of the lessons.

Mainstreaming English language learners benefits the school, all students, and the teachers. In Ms. Johnson and Ms. Michaels' classroom, there were six languages in addition to English that were spoken. When English language learners are mainstreamed, all students benefit from a culturally and linguistically diverse classroom and a culturally inclusive and language-aware curriculum (Clegg, 1996; Gibbons, 2002). English language learners are a whole school responsibility, not just the responsibility of the ELL teachers. The English language learners are just as much a part of Ms. Johnson's classroom as the other students. They have specific learning needs, as do the other students in the class. When Ms. Michaels worked with groups of students to give them

additional help, she took different students each time. She chose them based on their learning needs. Teachers that work in collaboration are better able to meet students learning needs and the teachers find that working cooperatively can make teaching more enjoyable (Bean, et al., 1999; Salend, et al., 2002). Ms. Johnson and Ms. Michaels are able to better meet the needs of their students by combining their expertise.

Mathematics continues to be a crucial language area (Brenner, 1994; Kimball, 1990; Krussel, 1998; Tevebaugh, 1998). St. Paul uses the *Everyday Math* series for its mathematics curriculum which is language intensive. Students need to learn the terminology of mathematics as well as the operational language. Mathematics has its own vocabulary, syntax and grammar. This makes integrating language with the math content even more crucial.

Mathematics teachers need to adjust their teaching methods to make the content more comprehensible for English language learners (Brenner, 1994; Garcia, 1991; Kimball, 1990; Krussel, 1998; Nolan, 1984; Sasser & Winninham, 1994; Tevebaugh, 1998). Increased language comprehension and proficiency are essential if English language learners are to achieve the level of mathematics literacy required of our students (Buchanan & Helman as cited in Tevebough, 1998). Ms. Johnson and Ms. Michaels' math lessons are language intensive. They reinforce vocabulary by writing, illustrating, and saying new words. Visual aides and realia are used to help make the word meanings and concepts clear. Students need to use language to transfer what has been learned in content

areas (Gibbons, 2002). The students in Ms. Johnson and Ms. Michaels' room are given time to discuss concepts with a partner during large group instruction. When they work on assignments, they work in heterogeneous groups. Groups are mixed by both math and language ability. Other sheltered instruction strategies need to be used in teaching math to English language learners: textbook illustrations, manipulatives, and graphic organizers (Sasser & Winninham, 1994). Ms. Johnson and Ms. Michaels incorporate these into their lessons whenever possible.

Implications of the Study

Improving teaching for all students should be the reason for making the decision to collaborate or co-teach. Often times teachers do not know that practices they use do support English language learners. Conversely, they do not know which practices do not support English language learners. It is often what they leave out that they are unaware of. By team teaching, mainstream teachers see modeled how to integrate language into the content. ELL teachers learn more about the expectations of the curriculum. It becomes a learning situation for both the ELL and mainstream teacher. Knowing the components of effective collaboration and how to make it work for English language learners will make me a better teacher and is probably the best way to ensure that my students will achieve English proficiency. The literature says that team teaching and collaboration are effective in helping students learn. If this is true, then learning to collaborate effectively with mainstream teachers is a goal that

teachers who are concerned with meeting the needs of their students should strive for.

After reading the research and observing a collaborative classroom, I have learned that St. Paul's ELL Department needs to continue to promote collaboration between ELL teachers and the mainstream. Effective collaborative teaching teams benefit all students and the teachers. If collaboration fails, it could be that teachers do not know how to implement models of collaboration, they do not have the time to plan and evaluate their curriculum, or they may not get the administrative support they need in order to implement collaboration at their school.

One of the most important factors in making collaboration work in schools is the principal (Brownell & Walther-Thomas, 2002). Forcing teachers together and telling them that they have to collaborate does not work. Principals need training in understanding what makes collaboration work and how to effectively implement it in their buildings. They need to know how to provide teachers with the tools and resources they need for working in collaborative teams. Principals need to know the importance of giving teachers the extra time they need in order to plan and evaluate their programs.

School districts need to provide inservices on ELL/Mainstream collaboration. Based on my observations and conversations with colleagues, it seems that much of the time, collaboration and team teaching are only marginally successful, if they succeed at all, because teachers do not fully realize the

benefits of collaboration or understand how to implement it. Every ELL teacher should be encouraged to attend training in collaboration with the mainstream teachers that they collaborate with. St. Paul's ELL Department offers a four-day workshop. This inservice training covers the topics of what collaboration is, it gives a brief background on what the research says about language learning, explains the different arrangements for co-teaching that teachers can use in their classrooms, and describes communication tools that can be used in group settings. Training such as this can give teachers some of the resources and tools they need to collaborate more effectively.

From my experience and observations of Ms. Johnson and Ms. Michaels, I have found a major obstacle that stands in the way to successful collaboration is the ability to have open and honest communication with colleagues. As teachers, we want to get along with our coworkers. I attended the ELL/Mainstream Collaboration training that is given by the St. Paul ELL Department with my co-teachers this year. We had an activity where we were to write on notecards things that were working for students, things that were not working for students, things that were working for the teachers, and things that were not working for the teachers. I found that I could not write down some of my true feelings about the things that I felt were not working for us. I wrote down things that nobody would feel offended by, like the lack of planning time. I think my colleagues did the same thing. No one wanted to offend the other person. Even though there are some things that can be improved in our teaming

situations, we were unable to address them at that time. Team members need to learn how to communicate with their teaching partners when they have concerns. This is difficult to do, but it is a skill that needs to be addressed if teaching teams are going to work. Inservice training on communication techniques would benefit most staffs.

I think that collaboration education needs to be a requirement in elementary teacher certification programs for both ELL and mainstream teachers. Course work should include both the research on collaboration and on the methodology of implementing co-teaching in their classrooms. Teachers need to come out of teacher preparation programs with the understanding of how collaboration and co-teaching helps them better meet the needs of all their students.

Finally, having an ELL teacher as a co-teacher in the mainstream classroom can make a tremendous difference in making the curriculum comprehensible for all the students. By focusing on the language and vocabulary of content instruction and scaffolding the lessons, English language learners are able to learn English as they learn the content curriculum. My study was on observing a mathematics classroom, but most of the methods used to teach are applicable across the curriculum.

Limitations of the Study

This was the study of a mainstream second-grade classroom where a mainstream and Language Academy teacher co-taught mathematics. Limitations to this study were time and the effect I had as an observer in the classroom.

Time to observe the classroom. I wanted to observe how a mainstream and ELL teacher met the language needs of the English language learners in a mathematics classroom. I observed seven times during the formal math period during a unit on geometry. I probably did not see all teaching techniques Ms. Johnson and Ms. Michaels use during those observations. There were times that Ms. Johnson gave the students time to work on their assignments later in the day when I was not present. I was missing small group work during those times, which is a very important component in working with English language learners. Also, the strategies Ms. Johnson and Ms. Michaels used during the geometry unit may be different from strategies they would use for a different unit.

Time to observe team planning. I was only able to observe one team planning session. I can not get an accurate picture of how Ms. Johnson and Ms. Michaels plan and evaluate their teaching based on a one-time observation.

The effect I had as an observer. My presence in the classroom could have brought about changes in Ms. Johnson and Ms. Michaels' behaviors. Participants in qualitative research will regulate their behavior in reaction to even subtle forms of feedback from the observer, such as when notes are taken. The extent to which an observer changes the situation studied is not at all clear (Merriam, 1998). I know that the teachers were aware of my presence because there were several times after my observations that Ms. Michaels asked me what I was writing.

Recommendations for the Future

As a result of this study, I plan to be proactive in promoting collaboration with my colleagues. Now that I have studied the research, I have the knowledge and a better understanding on how to make collaboration work effectively. When negative comments about collaboration are expressed, I can give suggestions on how to make a better teaching and learning environment through collaboration and co-teaching. I will personally seek out teachers that will be willing to co-teach with me. My Language Academy position at my school is ending at the end of this school year. When I consider a position for next year, I will be looking for a position that will enable me to co-teach with mainstream teachers.

I believe that all schools can benefit from training in meaningful communication between staff members. If a school is serious about promoting collaboration between teachers, it needs to get serious about having teachers trained in effective communication. Part of St. Paul's ELL Department collaboration training focuses on effective tools of communication within a group setting. I will recommend that this training should be part of the school's inservice training. Teachers need to know how to talk with each other before effective dialogue and discussion can take place.

What I Have Learned

When I started this project, I questioned if effective collaboration (co-teaching) with the mainstream was even possible. There seemed to be so many hurdles to overcome. Many teachers (mainstream and ELL) have negative attitudes towards collaboration. It seemed that most teachers wanted to continue to teach

the way they have always taught and not be bothered with the inconveniences of collaboration.

I have learned that collaboration is a lot of work, if done correctly, but it is worth the effort. English language learners need to be in the mainstream classroom as much as possible so that their language learning connects with their content learning. Pull-out instruction should only be used to focus on specific skills that English language learners cannot get in the mainstream classroom. Collaboration takes two teachers who are willing to take the extra time needed to plan together, co-teach, and then evaluate their curriculum together. Because of what I have learned from this project, I am willing to be one of those teachers. I want to provide my students with the best learning environment that is possible. That is accomplished through collaboration with the mainstream.

APPENDIX A
SAMPLE TEACHER CONSENT LETTER

November 25, 2003

Dear Teachers:

I am working on my Masters in ESL at Hamline University. The purpose of my research is to determine what strategies collaborating teachers use when working together in a mathematics classroom while accommodating for the language needs of their ESL students.

I have a brief questionnaire for you to fill out about your collaborating team and your teaching situation. These questions can be answered in one word or short statements, or in narrative form.

Before the case study begins, I will meet with you. During the course of the case study, I will observe your classroom during math approximately five times over a two-week period. I will also want to observe your collaborating team during two team-planning meetings. I may audio-record a team-planning meeting.

Aside from the imposition being made on your time to complete the questionnaire and an interview, or time spent in follow-up conversations, this study has no risks to you, as participants. All data collected from written sources or observations will be treated as confidential.

If you agree to be a part of this research study, your participation is voluntary and there is no penalty for refusing to participate. You may withdraw from participation at any time during the study.

If you would like more information or have any questions now or during the study, please call me at Battle Creek Elementary School, 293-8550 or at my home.

Thank you for your consideration,

Cathy Burrell
ESL Teacher, Battle Creek

I have read and understand the information contained in this consent form and I agree to participate in this study.

Signature

Date

APPENDIX B

SAMPLE PASSIVE PARENT CONSENT LETTER

January 7, 2004

Dear Parents:

I am working on my Masters in ESL at Hamline University. I am going to be doing some observations of your child's mathematics class at Homecroft in order to help me with my research. I will be observing how your child's mathematics teachers interact with each other and how they interact with the students in the classroom.

The purpose of the research is to determine how collaborating teachers work together in the teaching of mathematics while meeting the language needs of the ESL students in the classroom. St. Paul Public Schools has agreed to be cooperative in the research. The observations will take place in January.

I will not be identifying any students or using any of their names in this research. My focus will be on observing the teachers, Ms. Johnson and Ms. Michaels.

If you would like more information or have any concerns, please call me at Battle Creek Elementary School, 293-8550.

Thank you,

Cathy Burrell
ESL Teacher, Battle Creek

APPENDIX C
TEACHER SURVEY QUESTIONNAIRE

Pre-observation Survey

How many years have you been teaching? _____

As a classroom teacher? _____

As an ELL teacher? _____

How long have you been co-teaching together? _____

What other co-teaching experiences do you have?

Have you had training in collaboration/co-teaching? _____

If so, what training have you had?

How have you benefited from the training?

How many students are in your math class? _____

How many are ELLs? Language Academy Students? _____

What languages do your students speak and how many students do you have speaking each language?

How much time do you spend planning together for you math class?
Do you feel you have adequate time to plan?

What do you like most about team teaching?

What do like least about team teaching?

How has team teaching benefited your teaching?

How has team teaching benefited you students?

What makes you successful?

FINAL INTERVIEW QUESTIONS

Final Interview Questions

3. What is it about team teaching that you like the best?
4. What is it about team teaching that you like the least?
5. What would you improve or change in your present teaming situation?
6. How does the school support your teaming efforts?
7. How does the principal support your teaming efforts?
8. Do you consider yourselves to be an effective or successful team?

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