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Supplemental Instruction In A Community College Developmental Mathematics Curriculum: A Phenomenological Study Of Learning Experiences

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SUPPLEMENTAL INSTRUCTION IN A COMMUNITY COLLEGE
DEVELOPMENTAL MATHEMATICS CURRICULUM:
A PHENOMENOLOGICAL STUDY OF LEARNING EXPERIENCES

by

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ABSTRACT

Mirroring the changing demographics of the nation, the community college

student population continues to grow in size and in diversity. Almost half of all students

who enter these institutions need at least one remedial course, which is often

developmental mathematics. Developed in 1973, Supplemental Instruction (SI) has

quickly gained recognition as an academic support program that is used to aid student

performance, retention, and academic success. This dissertation used a

phenomenological approach to identify factors that motivated students' attendance and

subsequent learning experiences in SI sessions associated with developmental

mathematics.

Sources of data included five rounds of interviews (three with SI learners and two

with SI leaders), a Multiple Intelligence Inventory, and statistical information from the

referent community college. Study findings revealed eight themes that characterized

motivating factors for attending these optional instructional sessions. Moreover, nine

themes emerged from the data regarding types of activities learners experienced in SI.

Findings suggest that SI helps create a climate of achievement for learners taking

developmental mathematics in a community college setting.

This work is dedicated in loving memory of my grandparents,

Willard and Isabelle Nopper.

Their unwavering support was invaluable.

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Overall, I am proud of this accomplishment—completion of the Doctor of Philosophy in Curriculum and Instruction with a community college specialization—from the University of Central Florida, Orlando. However, I know that I could never have achieved my goals without the help and support of a remarkable "team" of professors, family, and friends.

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LIST OF ACRONYMS/ABBREVIATIONS

AACC   American Association of Community Colleges

FTIC   First-time-in-college

GPA   Grade Point Average

IDS   International Data Summary

LAC   Learning Assistance Centers

MI   Multiple Intelligence

SI   Supplemental Instruction

CHAPTER ONE:

INTRODUCTION

Since the formalized inception of American higher education at Harvard in 1636,

postsecondary education has changed from serving an elitist homogenous population of

learners (restricted by class, gender and race) to serving a more heterogeneous population

with tremendous differences in academic skills (Hodges, 2001). The current learner

population at both community colleges and four-year institutions is a composite of varied

individuals with diversity in socio-economic status, age, race, language, and ability level.

Specific to ability level, multiple authors have focused on underprepared and "at-risk"

learners—population cohorts who are participating in significant numbers in higher

education (Blanc, DeBuhr, & Martin, 1983; Boylan, 1999; Commander & Stratton, 1996;

Martin & Arendale, 1993; Martin, Blanc, & Arendale, 1996; Perez, 1998; Ramirez,

1997; Tinto, 1987).

In the wake of noticeable shifts in the demographics of learners engaged in higher

education, community colleges have given considerable attention to multiculturalism and

diversity, as these issues relate to retention and academic success for all learners (Levin,

2000). Regarding the impact of multiculturalism on the community college, Levin stated

the following:

Colleges altered their cultural emphases, becoming more attentive to learners'

cultural differences, more responsive in curriculum and instruction to

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multicultural needs, and more active in altering past practices of discrimination, with some colleges more pluralistic in their approach to both hiring and governing the institution than in the past. These changes served a number of purposes, from meeting learner needs to benefiting the college through learner recruitment and retention (p. 6).

Over the years, numerous programs have been used to assist students who are having academic difficulties (Boylan, 1999; Simpson, Hynd, Nist & Burrell, 1997). Jarvi (1998) contended that academic support and assistance programs, while common on college and university campuses, have not always been warmly received. These programs, which are designed to increase the success rates of students, include orientation seminars, tutorial sessions, discipline-specific help, learning assistance centers (LAC), learning labs, and/or individualized learning programs.

Adding to this list is a recent educational innovation, which originated in the early seventies—Supplemental Instruction (SI). Hodges (2001) remarked that "two of the more common forms of academic assistance available to students are tutoring and SI" (p. 2). Peer learning, "a generic term which refers to situations where students support each other in educational settings" (Ashwin, 2003, p. 159), is becoming an increasingly useful and viable retention strategy. SI, a form of peer learning, targets "high-risk" courses, and it is a nationally recognized academic support program that has been used effectively to aid student performance, retention, and academic success (Martin & Arendale, 1993).

Despite these support initiatives, developmental mathematics courses at many institutions continue to report low success rates. For example, at a Florida community college, the data collection site for this research study, approximately 66 % of entering

learners enroll in Pre-Algebra: MAT0012C or Beginning Algebra: MAT0024C, based on entry-level placement test scores. These developmental classes are primarily skills-based, and the course curriculum includes a substantial amount of material. MAT0012C and MAT0024C report learner success rates at 50 % and 43 %, respectively. The issue of underprepared learners continues to be a major concern in these courses.

<div align="center">Statement of Problem</div>

"Community colleges have played an important role in providing persons in underrepresented populations with access to higher education. This is a consequence of their commitment to open access, their proximity to diverse populations, and their relative low cost" (Harbour, Middleton, Lewis & Anderson, 2003, p. 835). While "learners 'at-risk' were at one time considered a special group needing specialized help, current definitions of the learner 'at-risk,' however, describe the majority of learners in American community colleges" (Perez, 1998, p. 63).

For several decades, learners academically underprepared for higher education study have increased in number and stabilized as a major, if not, *the* major, cohort in the population attending community colleges. Historical definitions of "at-risk" students have tended to focus on observable characteristics: race, ethnicity, socioeconomic standing, and status within the institutional setting. The American Association of Community Colleges (AACC) (as cited by Perez, 1998) suggested a more functional definition of "at-risk," one that describes the relationship between the resources a student brings to the educational experience and the demands the educational program makes on the student.

Community colleges, pioneers in "the paradigm shift from a focus on teaching to improvement of learner learning" (Arendale, 1998) and in the implementation of the learning college (O'Banion, 1997), face the daunting task of providing instruction in developmental courses to a growing number of learners, while maintaining traditional academic standards and improving learner retention. It seems, therefore, appropriate to explore retention strategies that *sort, support, connect, and transform* learners and the community college (Perez, 1998), especially in the "high-risk" curricular area of developmental mathematics, thereby enabling "at-risk" learners to successfully matriculate in this setting, and experience academic success, without diluting academic standards (Burmeister, 1996).

Purpose of the Study

The primary purpose of this qualitative research study was to examine, through a phenomenological approach, learner motivation to attend Supplemental Instruction sessions for developmental mathematics courses at a community college and the subsequent perceived learning experiences in these sessions. The study also compared learner reflections with the perspectives of SI leaders who provided peer assistance and academic support in such sessions.

While many studies in existing literature evaluate the effectiveness of SI, feedback is usually in the form of learner responses to survey items on a questionnaire (Hodges, 2001; Blanc, DeBuhr & Martin, 1983). These questionnaires are generally self-reported satisfaction indexes, which, unfortunately, do not provide descriptions about the experiences that learners have had during the SI sessions.

While national data on developmental mathematics at the community college reveals a success rate of only 52 % (Cohen & Brawer, 2003), existing studies on SI all but ignore its use in the institution's developmental mathematics curriculum. The research does, however, demonstrate that SI helps with retention and increases learners' grades. Information on factors that motivate learners to attend the first session and, thereafter, to continue the program and on underlying themes that describe students' experiences are essential to developmental mathematics educators.

The phenomenological aspect of these findings adheres to the tenets of qualitative research. "[O]ne of the chief reasons for conducting a qualitative study is that [it] is exploratory; not much has been written about the topic or population being studied, and the researcher seeks to listen to informants and to build a picture based on their ideas" (Creswell, 1994, p. 21). In particular, this research describes experiences of learners who are engaged in supplemental instruction sessions for developmental mathematics courses at a community college.

Conceptual Framework

The conceptual framework (see Figure 1) for this qualitative investigation draws from the literature on the Multiple Intelligences Theory (Gardner, 1983); learner retention and attrition (Tinto, 1987); and the ABC learner achievement theory (Tatum, 2000). Tatum's theory also interfaces well with that of Goleman (1995), who asserted that individuals have two primary emotional intelligences—interpersonal and intrapersonal— that substantiate a need for interaction and reflection among learners. Overall, the conceptual framework posits that learners in the community college setting arrive with

strengths and weaknesses in multiple intelligences; experience adjustment, isolation,

difficulty, and incongruence; and, may potentially experience a climate of achievement

through participation in SI sessions.

In recognizing multiple intelligences (Gardner, 1983) and traditional factors that

impact learner assimilation, attrition, matriculation, and retention (Tinto, 1987), SI offers

an interventional strategy that may give previously unsuccessful learners a second chance

at integration into the college community (Martin & Arendale, 1993), with SI leaders

aiding the process through building a climate of achievement (Tatum, 2000) (see Figure

1).
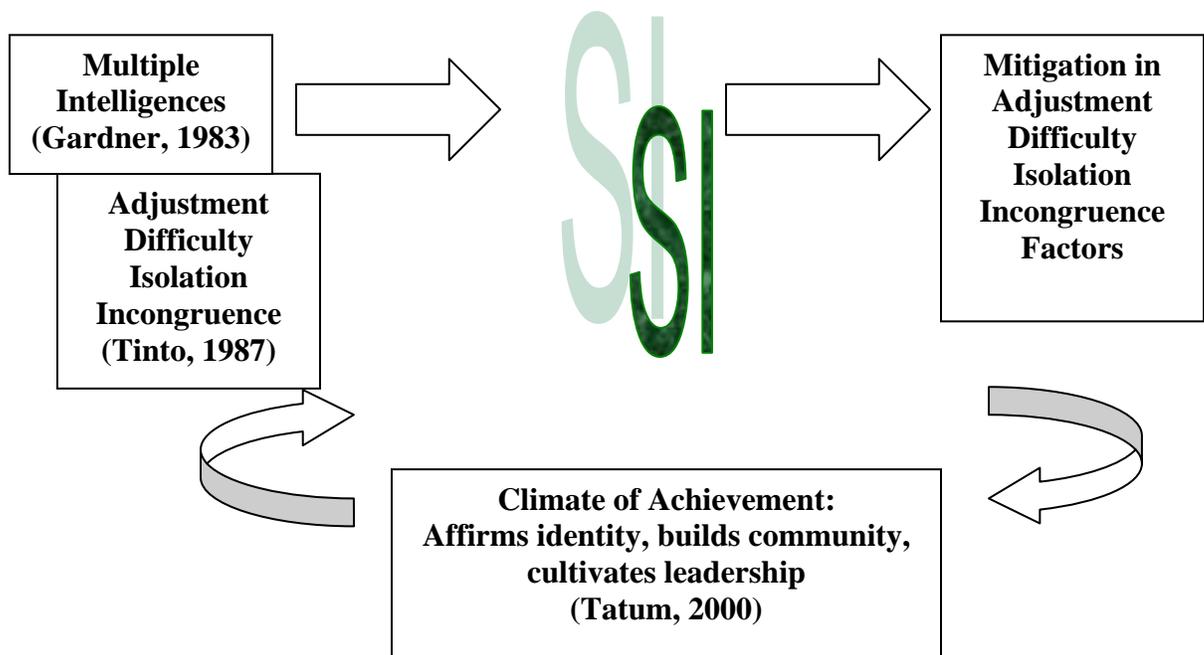
Figure 1. SI as a process for creating a climate of achievement for diverse learners

through academic and social integration in an interdependent learning community.

This research study conducted a phenomenological study of learner motivation to attend Supplemental Instruction sessions for two developmental mathematics courses at a Florida community college and of perceived learning experiences in these sessions. These questions guided this research:

1. What are the underlying themes regarding learner motivation in attending SI sessions that are associated with community college developmental mathematics courses?

2. From the perspective of learners, what are the underlying themes regarding learning experiences in SI sessions that are associated with developmental mathematics courses?

Methodology

This study used a phenomenological research design to describe learners' motivation for attending SI sessions associated with developmental mathematics course work and perceived learning experiences. In phenomenological studies, "human experiences are examined through the detailed descriptions of the people being studied" (Creswell, 1994, p. 12). "Phenomenographers do not make statements about the world as such, but about people's conceptions of the world" (Marion, 1997, p. 145).

Multiple interviews (beginning, middle, and ending of semester) with learners who attended SI sessions that were associated with two developmental mathematics courses in a community college setting were conducted. These interviews facilitated a phenomenological examination of learner experiences in non-quantifiable ways.

Moreover, two interviews were conducted (beginning and end of the semester) with the SI leaders. I was interested in learning whether the learners and the leaders had overlapping themes in terms of expectations and end-of-term results. Additionally, I recorded my experiences with SI. In doing so, I revealed my personal assumptions about the program.

This research adds to the current understanding of why learners choose to attend SI and how they experience learning. Learners and leaders also completed a MI inventory (see Appendix I), based on Gardner's (1983) theory of Multiple Intelligences.

Significance

Current studies—based on outcome measures and Likert scale satisfaction ratings—provide minimal insight into what motivates student to attend SI sessions and what they actually experience. Educators need to know what motivates learners to seek assistance for difficult course content. Moreover, learning experiences in SI sessions warrant investigation. Therefore, more research must be gathered.

The literature on SI has significant gaps in measuring the needs of "high-risk" learners in terms of motivation, locus of control, and self-efficacy (Hodges, 2001). To better describe the complexity of learner behaviors, this study gathered information using qualitative research, more specifically, a phenomenological approach, to provide descriptions of students' motivation for attending SI and subsequent learning experiences in these sessions.

Assumptions

The following assumptions were made while investigating the research questions.

1. Learner perception of the learning experiences and individual motivation may influence attendance in SI sessions associated with developmental mathematics courses at a community college.

2. No SI experience is the same as another; yet, underlying common themes may exist that describe student-learning experiences in developmental mathematics SI sessions at a community college.

3. Students would candidly share their learning experiences about SI sessions if they were able to do so in a non-threatening environment.

4. "The research questions [could] evolve and change during the study, a thought [which is] also consistent with the assumption of an emerging design" (Creswell, 1994, p. 71).

Limitations

The study was subject to the following limitations:

1. At the beginning of the semester, I visited the initial SI session of the developmental mathematics courses to explain the research project and secure signed informed consent forms for all potential study learners. Actual learners were limited to those from courses targeted for this study.

2. Perspectives of SI learners and leaders were confined to a single community college.

3. Results of this qualitative study may not be generalizable.

Actual SI Participant - A student who, at the time of initial interview, was enrolled in one of the SI courses selected for inclusion in this study; who was not personally known to the researcher prior to the interview; and who attended at least one of the SI sessions associated with the targeted courses. The SI participant will hereafter be referred to as learner.

Beginning Algebra: MAT0024C – A college-preparatory course, which is designed to supplement the algebraic background of learners prior to taking MAT1033C: Intermediate Algebra. Topics include sets, fundamental operations with polynomials, linear equations and inequalities with application, factoring and its use in algebra, introduction to graphing equations, introduction to radicals, and use of calculators.

Community College – "Any institution regionally accredited to award the associate in arts or the associate in science as its highest degree" (Cohen & Brawer, 2003, p.5). Presently, this definition is problematic because several state community college systems award the baccalaureate as the highest degree.

Developmental Mathematics – A remedial mathematics course offered to help the underprepared learner achieve the level of mathematics necessary to enroll in college level mathematics.

"High-risk" Course - Any college credit course, in which at least 30 % of learners received poor grades of *D, F*, or *W* (withdrawal).

Learning Experiences – Activities or lessons conducted by the SI leader.

Motivation – Reasons learners attend Supplemental Instruction sessions, either intrinsic or extrinsic.

Potential SI Participant – A student at the Florida community college under study who at the time of initial interview, was enrolled in one of the SI courses selected for inclusion, and who was not personally known to the researcher.

Pre-Algebra: MAT0012C – The first course in a college-preparatory, two-course sequence (MAT0012C and MAT0024C) designed to prepare learners for MAT1033C: Intermediate Algebra. Pre-Algebra emphasizes the fundamental mathematics operations with applications to Beginning Algebra.

Supplemental Instruction (SI) – A peer-learning, academic support program that targets "high-risk" courses rather than "high-risk" learners.

Supplemental Instruction Session – A regularly-scheduled, informal group-study session, conducted by a SI leader, in which students compare notes, develop organizational tools, and predict test items.

Supplemental Instruction Leader – A model student, hereafter referred to as leader, who is paid to attend all class meetings, and conduct the SI sessions.

CHAPTER TWO:

REVIEW OF THE LITERATURE

Developmental Mathematics in the Community College

In the literature, developmental students are also known as at-risk, underprepared, low-achieving, disadvantaged, non-traditional, and skill-deficient (Saxon & Boylan, 1999). Florida, Missouri, South Carolina, and Arizona have mandated that public universities not provide remedial courses to students (Rouche & Rouche, 1999). Therefore, the community colleges in these states provide support for developmental education.

Nationally, 40% of first-time students entering the community college enroll in at least one remedial course (Saxon & Boylan, 1999). In Florida, for example, approximately 80% of students enroll in remedial courses (Cohen & Brawer, 2003). Specifically, 67 % of incoming students need a developmental mathematics course (Rouche & Rouche, 1999). This problem is compounded by the fact that the success rate nationally is 67% and even worse in Florida with nearly half of the students not completing the course (Cohen & Brawer, 2003).

Definition of SI

"Two of the more common forms of academic assistance available to learners are tutoring and SI" (Hodges, 2001, p. 2). Peer learning, "a generic term which refers to

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situations where learners support each other in educational settings" (Ashwin, 2003, p. 159), is becoming an increasingly useful and viable retention strategy. SI, a form of peer learning, targets both developmental and college-level courses, and it is a nationally recognized academic support program that has been used effectively to aid learner performance, retention and academic success (Martin & Arendale, 1993).

However, SI is different from other retention models or academic assistance programs, because it targets "high-risk," historically difficult courses, rather than "at-risk" learners, which makes SI, by design, a non-remedial program (Commander & Stratton, 1996). A "high-risk course" is one perceived by learners to be conceptually difficult (McCarthy & Smuts, 1997), based on GPA's earned in the course and success rate upon completion (Martin & Arendale, 1993).

SI is proactive, rather than reactive, assistance to individual learners. Problems with conceptual difficulty are addressed, presumably, before they occur, because SI is open to all learners enrolled in a specific "at-risk" course. "In SI, the peer learning sessions take place outside the mainstream curriculum with the SI users' attendance at the sessions being voluntary" (Ashwin, 2003, p. 160), although Hodges (1997) conducted experimental research in which he suggested the use of mandatory attendance.

Sessions focus on mastering learner success skills, such as note-taking, test-anxiety issues, and time-management (Maxwell, 1998). McCarthy and Smuts (1997) found that the learning community developed in SI improved learner performance, retention, and graduation rates. Typically, sessions are optional and are conducted by leaders, students who have already taken and passed the "high-risk course" to which they are assigned with at least a "high-B" average. These students, who are integral to the

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program, are paid to attend all sessions of the course, take notes, read all assigned material, conduct weekly pre-scheduled sessions, and receive training in specific teaching/learning theories and techniques. For example, in a typical college algebra session, the leader might pursue one or more of the following activities: instigate a discussion of class notes and clarify any misconceptions; present a mock test or quiz; or create a cooperative activity for learners to complete. Leaders are considered model students, given their understanding and knowledge of content and subject matter. The leader is a peer, embodying the skills necessary for responsible life-long learning (Martin, Blanc & Arendale, 1996) and providing a role model for successful college adjustment.

Maxwell (as cited in Wright, Wright & Lamb, 2002) characterized SI as follows:

1. It is a form of group tutoring requiring the SI leader (usually a peer tutor) to work very closely with the course instructor and those learners who wish to participate in the session.

2. It is designed to assist learners not only with course content but also with their competency in reading, critical thinking, and study skills.

3. Leaders are usually paid undergraduates who, in many cases, have recently shown exemplary performance in the courses for which they serve. Moreover, these students have high overall grade point averages and exhibit good study habits.

4. Leaders attend course lectures, take notes, and complete assignments with the enrolled learners.

5.   Leaders conduct and schedule a minimum of two 50-minute sessions each week. These are scheduled at times convenient to as many of the enrolled learners as possible.

6.   Successful leaders, like good tutors, are well trained in learning theories, methods of tutoring, and collaborative learning.

<u>History of SI</u>

Deanna Martin introduced the SI program to higher education in 1973 at the University of Missouri-Kansas City. Since then, SI has been implemented at a variety of institutions in the United States (e. g., Leeward Community College, Oakland Community College, Penn State University, Purdue University, Texas A&M University, University of North Carolina, and the University of North Texas) and around the world (e. g., Linkoping Institute of Technology, Inter American University, Lund University, Stockholm Institute of Education and University of Port Elizabeth). Martin's idea was to target "high-risk courses" rather than "high-risk" learners. A "high-risk course" is operationally defined as any college credit course, in which at least thirty percent of the learners received poor marks of *D, F* or *W* (Burmeister, 1996). Martin's concept was to assist learners in courses that are perceived as difficult, thereby improving overall college retention.

<u>SI Impact</u>

Doty (2003) compiled an International Data Summary (IDS) that spanned the period 1998 to 2003 and used data from public and private two-year and four-year

colleges to determine the effect SI has on grades and retention. The study compared the success of students who volunteered to participate in SI versus those who did not. Doty's research indicated that participants in SI had a significantly better GPA than non-participants did not. In a similar study, Blanc, DeBuhr, and Martin (1983) studied four-year institutions and found that not only did SI learners reenroll at a higher rate than non-participants, but that the former maintained full- or part-time status for two semesters. Another study (Wolfe, 1998), which geared research toward community college learners, found statistically significant evidence that the program affected success and retention rates. Wolfe also reported that SI had a positive affect on special populations, such as developmental and minority learners.

SI in Developmental Mathematics

Although SI has been successfully used at a variety of institutions, debate persists over its effectiveness in developmental courses, specifically developmental mathematics (Blanc, DeBuhr & Martin, 1983; Martin & Arendale, 1993; Congos & Schoeps, 1993; Hodges, 2001; Wolfe, 1998). Some researchers (Kenney, 1989; Kotze, 1994; Stephens, 1995) asserted that SI, a form of peer learning, supports increased academic achievement and mastery of mathematical concepts. Many studies (Martin & Arendale, 1993; Congos & Schoeps, 1993; Ramirez, 1997; Martin, Blanc & Arendale, 1996) recommended that institutions, which adopt the program, use it only in non-remedial settings with "high-risk," demanding courses. In mathematics, these courses include college algebra, college trigonometry, and the calculus.

Boylan (1999) asserted that although SI is not usually recommended by the

National Center for Supplemental Instruction for developmental classes, it is listed as one

of the eleven "Level One Best Practices" in developmental education. Boylan's

contradiction is important to developmental mathematics learners at community colleges

in particular because retention of underprepared students needs to be addressed. Further,

participation in learning communities may enable these students to acquire life-long

skills.

Prior Analyses

This review of the literature reveals that most of the research on SI has been

performed quantitatively. Some studies used independent t-tests to compare final course

grades of participants and non-participants (Congos & Schoeps, 1993; Doty, 2003;

Hodges, 2001; McCarthy & Smutz, 1997; Ramirez, 1997; Wolfe, 1998; Wright, Wright

& Lamb, 2002). These studies reported statistically significant results that the program

does influence GPA and retention. When chi-square analyses were used comparatively

(see, for example, Blanc, DeBuhr & Martin, 1983), these studies reported finding

statistically significant evidence that participants earned more *A's, B's* and *C's* and fewer

D's, F's and *W's* than non-participants.

Hodges (2001) performed a different type of quantitative study in which he used a

pre- and post-Likert scaled instrument to examine learners' perceived locus of control,

self-efficacy, and self-esteem. Findings suggested that those who used SI had a stronger

locus of control, better self-efficacy, and improved self-esteem than those who did not.

Especially noteworthy is the fact that learners of all ability groupings sought out SI session participation.

Learner motivation, another factor of interest to SI researchers, is controversial. Blanc, DeBuhr, and Martin (1983) studied motivation by using high school GPA's and standardized test scores to see if those scores predicted motivation to attend SI sessions. By contrast, McCarthy and Smutz (1997) asserted that high school scores cannot measure college motivation, suggesting instead that motivation be studied using qualitative research in the form of surveys, interviews, and informal discussions. The one point on which these researchers agreed was that motivation seemed to be the hardest item to measure in SI research (Blanc, DeBuhr, & Martin, 1983; Burmeister, 1996; McCarthy & Smutz, 1997).

<div align="center">Theorists Guiding the Conceptual Framework</div>

Tinto's Factors Influencing Student Success

Tinto's 1987 research, which identifies factors that relate to student attrition, is probably one of the most frequently cited student retention models in the professional literature (Boylan, 1999; Commander & Stratton, 1996; Martin & Arendale, 1993; Martin, Blanc, & Arendale, 1996; Ramirez, 1997). Tinto noted that incoming students were unable to meet the minimum standards required in entry-level courses. He identified four factors—adjustment, isolation, difficulty, and incongruity—that contribute to attrition during the first year of college.

Adjustment to college appears to be problematic for almost all learners (Martin, Blanc, & Arendale, 1996), while *isolation* is perhaps exacerbated by the increasing

diversity in the learner population, which, in turn, may lead to *difficulty* in establishing interpersonal relationships and *incongruity* in the inability of learners to interact successfully both socially and intellectually. For example, the learners come to the institution for classes, but are unable to get involved in the campus life for a variety of reasons. SI has the capacity to provide solutions that circumvent many of the obstacles identified in Tinto's research.

Adjustment.

Many learners are not prepared for college and really do not know how to study (Martin & Arendale, 1993). Cognitive scientist and developmental psychologist Piaget (1969) referenced the importance of learner-to-learner interaction in knowledge construction and development (Driscoll, 2000). In his Zone of Proximal Development (ZPD), Vygotsky (1978) suggested that education is a social enterprise, demonstrating that a gap exists between a learner working in isolation and a learner working collaboratively with a more knowledgeable peer. Working in cooperative situations with more capable learners improves content comprehension (Vygotsky, 1978).

The Vygotskian sociocultural framework of learning supports an environment where students can negotiate and construct meaning without the leader informing the student of the correct answer (Driscoll, 2000). Scaffolding takes place when the learner is able to comprehend the information and add to previous knowledge (Driscoll, 2000). Moreover, proponents of SI claim that it does more than just review content material.

SI reportedly helps learners engage in thinking behaviors, which facilitate connections between notes, textbook, and problems (Martin & Arendale, 1993). Sessions integrate study skills into specific "high-risk courses," and help learners figure out the

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best methods of assimilating the material (Wolfe, 1998). Wolfe found that learners

attend sessions primarily for course assistance and regard the acquisition of independent

study skills as a bonus.

Many struggling learners who do take part in SI would customarily shy away

from the traditional forms of remediation such as tutoring. Congos and Schoeps (1993)

suggested that learners view SI as being different from tutoring. Less of a stigma is

associated with these sessions because they include students who have heterogeneous

abilities (Hodges, 2001). Hodges added that learners have a better chance in the program

because they did not have to fail a test first to receive help. Students in the targeted

course may act proactively because they were invited to SI sessions from the beginning

of the semester.

Independence is at risk, as learners cannot handle the newfound freedom of

college. The experienced SI leader helps learner to comprehend that even though the

professor does not check homework or attendance, the student is still expected to take

appropriate notes and to study the detailed information in order to pass the test. The

leader is a peer who embodies the skills necessary for responsible life-long learning

(Martin, Blanc & Arendale, 1996), thus providing a role model for successful adjustment

in college.

Isolation.

SI combats social isolation by helping to establish connections between learners

and SI leaders. All learners in the session share a common focus and goal (Martin,

Blanc, & Arendale, 1996). Several studies have demonstrated the effectiveness of such

peer-group learning (Tinto, 1987). These studies on cooperative learning groups also

support the findings of developmental psychologists such as Piaget, Bruner, and Vygotsky (Driscoll, 2000). The session provides a non-threatening environment where learners, despite culturally diverse backgrounds, can meet and get to know each other through interaction with the subject matter (Martin & Arendale, 1993).

Further, studies suggested that SI improves the grades of minority, non-traditional, low-risk, and "high-risk" learners (Congos & Schoeps, 1993; Wolfe, 1998). As more adults continue their education, universities and community colleges become more heterogeneous, forcing them to develop new ways to combat isolation. It is especially critical at community colleges because of the life demands on adults, such as family, work, and commuting. Historically, commuters do not participate in social activities on campus (Tinto, 1987; Wolfe, 1998). SI offers a curricular venue to counter alienation and uses the academic group work to build bonds between learners (Wolfe, 1998).

Isolation also exists when learners fail to see individual entities that become an integrated whole, for example, the connection between study skills taught in a student success course and the application of those skills in a mathematics course. Remedial mathematics courses are imperiled because the curriculum has not been developed to implement study skills into the content. More often than not, the content and the associated study skills are taught in isolation (Martin & Arendale, 1993).

Difficulty.

By definition, students enrolled in developmental coursework are likely to experience and/or have experienced academic difficulty. SI was developed for "high-risk courses" and those that are perceived to be difficult by both the student and the teacher

(Martin, Blanc, & Arendale, 1996). Typically, it is attached only to courses in which the difficulty level is perceived to be high: For example, 30 % or more of the students get a *D, F, or W.* Research indicates that implementation of SI may be hampered unless both students and teachers perceive the course to be difficult (Blanc, DeBuhr & Martin, 1983; Hodges, 2001; Martin & Arendale, 1993; Martin, Blanc & Arendale, 1996). Moreover, students engaged in developmental coursework, particularly in the community college setting, experience difficulty in integrating into the mainstream college-level mathematics curriculum. SI provides an ideal conduit for minimizing difficulty in academic and social integration for these learners. Arendale (2002) offered SI as a vehicle for delivering the best practices of developmental education into the mainstream of higher education teaching and learning.

Incongruence.

A primary focus of SI sessions is to aid learner assimilation and understanding of course content by thinking, reasoning, analyzing, organizing, and problem-solving. Learners practice skills to gain concrete experience with application of ideas while using the language of the subject matter (Hodges, 2001). Sessions promote academic success, thus enabling students to feel that they are a part of the college's intellectual community (Martin, Blanc, & Arendale, 1996). SI also encourages working together as a team toward a common goal.

Gardner's Theory of Multiple Intelligences

Many psychologists and educators have explored the topic of measuring and identifying intelligence (Gardner, 1983). In 1916, Binet and Simon created one of the first intelligence tests to help identify the progress of children. Other intelligence tests

and theories have surfaced over the years, including popular theories and observations made by Jean Piaget (Driscoll, 2000).

Howard Gardner's Multiple Intelligence (MI) theory, introduced in 1983, identified seven intelligences (i. e., linguistic/verbal, logical/mathematical, musical/rhythmic, visual/spatial, bodily/kinesthetic, interpersonal, and intrapersonal) as ways in which people learn and are intelligent. Individuals tend to have multiple and/or dominant intelligences, and various tools are available to identify these intelligences (1983).

In addition, Gardner (1983) suggested that people are smart in ways other than verbal/linguistic and logical/mathematical, which traditionally are most often identified with intelligence. Daniel Goleman (1995) focused on emotional intelligence (EI), which indicates a kind of intelligence or skill that involves the ability to perceive, assess, and positively influence one's own and other people's emotions. Goleman's EI theory includes two of Gardner's intelligences—interpersonal and intrapersonal—that students need to successfully interact with others.

Tatum's Climate of Achievement Theory

Tatum (2000) developed her ABC Theory (affirm identity, build community, and cultivate leadership), stating that every student in a learning environment needs a supportive climate of achievement. To affirm identity, students must be able to identify themselves in the culture of the institution. Then, they can build a new community of diverse learners by recognizing one another's similarities. Within these communities, ultimately, leadership is necessary. SI Leaders play an integral role in effecting a climate of achievement for diverse learners.

Summary

A review of the literature revealed that a majority of incoming students who enroll in the community college need a developmental course in mathematics. SI, a form of peer learning, is a nationally recognized academic support program that has been used effectively to aid learner performance, retention and academic success. The program offers invaluable assistance to individual learners, including those who enroll in developmental mathematics.

Of the empirical studies reviewed, researchers described SI as a strategy for improving learner performance, retention, and graduation rates. Further, studies suggested that SI improves the grades of specific student populations: minority, non-traditional, low-risk, and "high-risk" learners. Moreover, the literature identified theories from Vincent Tinto, Howard Gardner, Daniel Goleman, and Beverly Daniel Tatum that link to render SI as a process for creating a climate of achievement for diverse learners through academic and social integration in an interdependent learning community.

Research indicated that implementation of SI may be hampered unless both students and teachers perceive the course to be difficult. Gaps in existing research also supported a need to further examine the utility of SI in creating a climate of achievement for learners, particularly those who enroll in developmental courses. Specific to community colleges, the number of students who enroll in these courses and their associated success rate, in the absence of intervention, suggested a need for additional research. Finally, a review of the literature revealed that most of the research on SI has been performed quantitatively and, thus, substantiated the need for greater qualitative research, such as this phenomenological study.

CHAPTER THREE:

METHODOLOGY

This qualitative research study examined, through a phenomenological approach, learners' motivation to attend supplemental instruction sessions for developmental mathematics courses at a community college and perceived learning experiences. The study also compared learners' reflections with the perspectives of leaders who provided peer assistance and academic support in SI sessions for these courses.

In phenomenological studies, "human experiences are examined through the detailed descriptions of the people being studied" (Creswell, 1994, p. 12). "Phenomenographers do not make statements about the world as such, but about people's conceptions of the world" (Marion, 1997, p. 145).

Setting

The site for this research was a Florida community college, which serves two counties in Central Florida. The college, founded in the late 1960's, has six campus locations, serving more than 43,000 students annually. The student population is diverse, with almost half belonging to minority groups. Sixty-three percent of these students are part-time.

Approximately 80% of the students enroll in one of fifty areas of concentration for Associate of Arts degree programs and plan to continue education at a university. In this study, the largest campus of the college, which has a student population of approximately 11,500, was the data collection site

The courses targeted for examination in this study were developmental mathematics courses: Pre-Algebra: MAT0012C and Beginning Algebra: MAT0024C, which have very low success rates college-wide, 50% and 43%, respectively. Approximately 54% of first-time-in-college (FTIC) students have a placement score that requires remediation.

Sixty-six percent of the students entering this community college test at a low competency level in mathematics, and accordingly, they are considered "at-risk," or underprepared for success in college-level mathematics. Invariably, these students begin their curriculum in developmental courses, specifically Pre-Algebra: MAT0012C or Beginning Algebra, MAT0024C. Table 1 displays the demographic distributions for the 2004 - 2005 academic year for the general college population, all enrollments in MAT0012C and MAT0024C, and SI linked enrollments in MAT0012C and MAT0024C.

Table 1. Demographic Distributions for 2004 – 2005 Academic Year (in percentage)

	College Population	All Campus MAT0012	SI MAT0012	All Campus MAT0024	SI MAT0024C
Caucasian	50.3	45	40.3	45	49.6
African American	14.7	14	17.6	14.4	10.9
Native American	.5	.8	.8	.8	.8
Asian/ Pacific Islander	5.7	4.2	5.0	4.2	3.4
Hispanic	22.0	27.1	27.1	27.1	28.6
Other	6.8	8.1	9.2	8.1	6.7

Females make up 56.4% of both the MAT0012C and MAT0024C enrollment on the large campus, and males are 43.6% of the student population.

In this study, all leaders underwent formal training at the beginning of the semester (see Appendix H), with continued training every Friday throughout the semester. Leaders for sessions had varied experiences with SI. Table 2 presents a summary description of SI leaders. Their names are pseudonyms.

Table 2. Summary Description of SI Leaders in Sample

Leader	First Language	Number of semesters as leader	Developmental Mathematics	Race or Ethnicity	Age
Isaac	Spanish	1	No	Hispanic	23
Claudia	Spanish	2	Yes	Hispanic	23
Patrick	English	1	No	Caucasian	20
Marissa	English	1	No	Caucasian	21
Nitin	Hindi	1	No	Indian	18
Sebastian	Spanish	1	No	Hispanic	22
Aurora	English	4	Yes	Caucasian	23
Justin	English	2	Yes	Hispanic	19

There were eight leaders in this study: three females and five males. The first four leaders in the Table 2 were education majors. The other four were majoring in engineering, music, art history, and chemistry, respectively. All leaders were sophomores and plan to graduate within 2005 with an Associate degree. Issac, James, and Claudia were not first-time-in-college students; in fact, James and Claudia had returned to the college to change their majors.

Population

The population consisted of all students enrolled in one of ten developmental mathematics course sections at the largest campus of the college in the spring of 2005. Two courses were targeted: Pre-Algebra: MAT0012C and Beginning Algebra: MAT0024C. Rationale for use of these courses included the following:

1. Developmental mathematics courses at this campus of the community college historically report extremely poor retention percentages.

2. These courses have similar organizational structures in SI sessions, although the content varied. This characteristic provided an opportunity to distinguish students' perceptions about the course content and the SI sessions.

3. As the SI faculty liaison and a mathematics professor at the college, the author of this study had access to current and potential SI leaders, who were interested in voluntary participation with the research in this study.

4. Enrollment in the five sections of MAT0012C and the five sections of MAT0024C was 117 and 119 students, respectively, during this spring term. These statistics provided a large enough population from which to derive data to support this endeavor.

<p style="text-align:center">Sample</p>

Obtaining the sample meant attending the SI training session before the targeted spring courses began to secure informed consent from the leaders. Next, a session for each leader was observed during the first week of SI meetings for the courses (N=10). At these initial sessions, the research project was explained to potential learners. Informed consent forms from all possible participants were secured—learners (see Appendix G) and leaders (see Appendix F). Forms included a request that interviews with the study participants be audiotaped.

From those learners who consented to participate in the study, purposive sampling was used to identify a group with maximum variation and representation. The sample

included students representing diverse experiences and demographics, such as prior experiences in SI sessions, prior coursework in a related content area, length of time enrolled at the community college, gender, race, and age.

Ten learners from the respective courses and the associated sessions were selected. Perspectives from learners who were successful and unsuccessful in developmental mathematics classes were important to this study. Accordingly, students who withdrew from the courses, and/or who discontinued participation in the voluntary SI sessions before the completion of the study were interviewed.

Because there were 10 sessions and 10 learners were chosen for the study, having a student from each course was not a representative option for this research. Instead, a purposive sampling based upon the learners who were interested in participating was done. Focus was not placed on what sections of the 10 math course the learners were from. Table 3 presents a summary description of the SI learners in the study. In like manner as the leaders, these participants were also given pseudonyms.

Table 3. Summary Description of Learners in Sample

Enrolled in MAT0024 during Spring 2005

Learner	Placement Test Score Elem, Arith	Major	Number of Attempts per Course	Race or Ethnicity	First Language	Age	Final Course Grade
Isabella	No scores	Nursing	2 (0012) 1 (0024)	Hispanic	Spanish	41	B
Ernesto	71, no score	Culinary	1 (0024)	Hispanic	Spanish	19	WP
Denise	21, no score	Veterinary Medicine	1 (0012) 3 (0024)	Caucasian	English	20	C

Enrolled in MAT0012 during Spring 2005

Learner	Placement Test Score Elem, Arith	Major	Number of Attempts per Course	Race or Ethnicity	First Language	Age	Final Course Grade
Garth	No scores	Radiology	1 (0012)	Asian/-Pacific Islander	English	34	A
Judy	41, 41	Early Childhood Education	2 (0012)	Hispanic	Spanish	19	A
Jasmine	31, 54	Respiratory Care	1 (0012)	Asian/-Pacific Islander	Tagalog	39	A
Betty	29, 33	Nursing	1 (0012)	Caucasian	English	24	A
Steve	27, 50	Engineering	1 (0012)	Caucasian	English	26	A
Mike	32, 39	Criminal Justice	2 (0012)	Caucasian	English	29	WP
Veronica	22, 36	Early Childhood Education	1 (0012)	Hispanic	English	47	WP

Six females and four males in the sample represented the developmental mathematics population. Six were part-time students (less than twelve credit hours); four were full-time students (taking twelve or more credit hours). Six were FTIC students. Only one student, Isabella, had prior experience with SI. This term was her third experience with SI. Garth and Jasmine are siblings who decided to take a class together.

Learners were from six of ten courses in the population. Even though none was from Nitin's or Sebastian's sessions, those leaders were interviewed to see if they corroborated learner themes from the other leaders' sessions. For the learners enrolled in Pre-Algebra courses, Garth, Jasmine, and Judy participated in Isaac's sessions, while Betty, Steve, and Mike had Patrick as their leader, and Veronica was in Marissa's session. For the Beginning Algebra classes, Aurora, Isabella, and Ernesto (leaders) worked with Denise, Claudia, and Justin (learners), respectively.

Instrumentation

Five protocols were used in the interview series (see Appendices A through E). Appendices A, C, and D were used with learners; B and E, with leaders. Interview questions were general and open-ended to allow the interviewee to establish the content and direction.

The first learner interview was conducted during the second and third weeks of the SI sessions. The rationale for its development and purpose is provided in Appendix A. The first leader interview was performed during the fifth and sixth weeks. The rationale for the associated development and purpose is provided in Appendix B.

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The second learner interview was given during the eighth and ninth weeks, just before the withdrawal deadline for the course. The rationale for the associated development and purpose is provided in Appendix C. The third and final learner interview was completed after each learner's final exam date for the course. The rationale for the associated development and purpose is provided in Appendix D.

The second and final leader interview did not begin until after all of the learners had been interviewed. The rationale for the associated development and purpose is provided in Appendix E.

The author of this study, hereafter referred to as the interviewer, conducted all interviews in the data collection process. Before each of the five sets of interviews, the learners and leaders were reminded that they did not have to answer any question they did not wish to answer and that the interview was confidential. Member checks were performed at the end of every interview by repeating the interviewer's understanding of the learner's or the leader's responses. Confirmation or clarification was requested on main points.

Learners and leaders also completed an Multiple Intelligences (MI) inventory (see Appendix I and http://surfaquarium.com/MI/inventory.htm, Mackenzie, 1999). Results generated a composite profile of learners (see Table 4) and leaders (see Table 5). Basic demographic information regarding learners (see Table 3) and leaders (see Table 2) was collected.

Table 4. Multiple Intelligence (MI) Profiles of the Learners (N=10)

Learner	1	2	3	4	5	6	7	8	9
Isabella	40	100	60	100	80	80	50	100	70
Ernesto	40	70	60	70	60	80	10	70	50
Denise	80	50	60	20	20	70	10	50	40
Garth	90	80	70	100	80	80	60	80	100
Judy	30	80	30	60	100	80	60	80	60
Jasmine	30	50	80	20	80	40	40	90	50
Betty	70	60	70	50	90	40	40	90	60
Steve	100	70	60	40	50	90	40	40	70
Mike	70	70	60	50	60	70	40	100	40
Veronica	60	60	60	40	70	80	30	80	50

No patterns were evident in the multiple intelligences that represent the types of learners attracted to the SI sessions. These data reinforced the idea that the students who enroll in these developmental mathematics courses are diverse. Other institutional data (e. g., CPT scores) suggested that students' motivation to attend did not relate to placement test scores. Data from the MI inventory and CPT institutional data further validated the claim that learners do not perceive SI as a remedial program when it is offered to each student in the class from course inception.

Table 5. Multiple Intelligence (MI) Profiles of the Leaders (N=8)

Leader	1	2	3	4	5	6	7	8	9
Isaac	30	50	70	70	40	70	50	80	60
Claudia	70	10	40	70	30	80	30	50	30
Patrick	40	100	70	40	60	80	70	60	100
Marissa	50	90	90	100	40	70	70	90	30
Nitin	80	60	70	90	90	100	50	90	70
Sebastian	70	90	60	90	60	90	60	90	90
Aurora	80	90	80	100	30	70	70	90	80
Justin	30	50	40	40	60	60	50	50	70

No patterns were revealed in the multiple intelligences that represent the types of leaders who conducted SI sessions. Leaders appeared to be as diverse as learners who participated in SI.

Data Collection

Multiple interviews (at the beginning, middle, and ending of semester) with students who attended SI sessions that were associated with two developmental mathematics courses in a community college setting were conducted. These interviews facilitated a phenomenological examination of student experiences in non-quantifiable ways. Two interviews (at the beginning and end of the semester) were also conducted with SI leaders. The purpose was to determine whether learners and leaders have overlapping themes in terms of expectations and outcomes.

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The interviewer's experiences with and assumptions about SI were fully described and involved the following: being in high school mathematics education; being a tutor and a student at the community college under study; and being a developmental mathematics faculty, and a SI faculty liaison.

<div align="center">Data Analysis</div>

The interviewer recorded and transcribed, verbatim, the raw data, from the interviews with the learners and leaders. Subsequent to transcription, data were analyzed using a modified version of the Stevick-Colaizzi-Keen method, often employed in phenomenological studies (Creswell, 1998, p. 147). In applying this method, sequential steps were followed:

1. The interviewer's experiences with SI were fully described.

2. Interview transcripts were examined to identify statements that described learner motivation to attend SI sessions and their associated experiences in these sessions. These statements were organized into a list of non-repetitive, non-overlapping statements, a process known as horizonalization of the data (Creswell, 1998).

3. Non-overlapping statements were grouped into "meaning units" and textural descriptions (Miles & Huberman, 1994; Rossman & Rallis, 2003), which described what happened in the experience, including verbatim examples (Creswell, 1998, p. 150).

4. Textural descriptions were examined and different perspectives and possible meanings were explored to more fully detail students' SI experiences.

5. An overall description of the meaning and essence of student motivation to attend these developmental mathematics SI sessions, and their subsequent learning experiences was derived.

This process was followed first for the interviewer's account of the experience and then for each participant's (Creswell, 1998).

First Round Learner and Leader Interview Procedures

The ten learners were randomly contacted within a two-week period beginning the second and ending the third week of SI sessions. All learners voluntarily answered all interview questions. The initial learner interview protocol and the rationale for identification and selection of the interview questions are provided it in appendix A. The raw data from the interviews were audio recorded and transcribed verbatim for each participant. Before any specific analysis began, data was processed four times: Actual interviews were conducted; a complete transcript of each interview was made; the transcription log of the interviews was verified for accuracy; and a second reading was done to get a sense of the whole.

The data were analyzed using the phenomenological approach described by Creswell (1998). Such an analysis employs the methodology of reduction and analyzes specific statements and themes. In this method, statements in the learners' interviews that describe learning activities and experiences in the SI sessions were targeted. This was first done for the individual students and then for the group as a whole. These statements were organized into a list of non-repetitive and non-overlapping comments that were all considered to have equal value. This process is known as "horizonalization"

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of the data, which results in a complete listing of all descriptive statements (Creswell, 1998, p. 147).

Analysis of the 10 learners' interviews produced 133 non-repetitive and non-overlapping statements. They were grouped into 10 categories of emerging themes or meaning units for further investigation in the second round of interviews. Descriptors included characteristics of good learning experiences, feelings about good learning experiences, characteristics of bad learning experiences, feelings associated with bad learning experiences, learning activities in the sessions, activities in the developmental mathematics classroom that detract from learning, motivation to attend sessions, reasons to discontinue sessions, characteristics of the leader, and additional benefits of and ideas about the program.

The primary purpose of this phenomenological study was to describe learners' motivation to attend supplemental instruction sessions for developmental mathematics courses at a community college and perceived learning experiences. However, perceptions from the leaders were used as verification and additional contextual information to the learners' interview statements.

The leaders were interviewed in the third and fourth weeks of SI sessions after the initial learner interviews were completed. The initial leader interview protocol and the rationale for the identification of collection of the interview questions are provided in Appendix B. The purpose of this interview was to compare the statements of the learners with assumptions and expectations made by the leaders. The leaders' interviews provided a description of what the leader expected the learners to be experiencing, but not necessarily what the learners actually experienced.

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Second Round of Learner Interview Procedure

This round of learner interviews was conducted during the sixth and seventh weeks of SI sessions, just before the withdrawal deadline for the course. Interview questions were structured to gather additional detail on the motivation to attend learning experiences and types of experiences and further investigate the meaning units generated from the initial interviews. The questions were developed from the learners' perspective and provided information about the following: learning activities in the program, learning activities students used or planned to use in future courses, interaction with other group members, characteristics of leader, feelings about attending the session, reasons for attending, and likes and dislikes about developmental mathematics courses and the sessions associated with them. Some questions were repeated in the second round because learners had acquired more learning experiences on which to base responses. The second learner interview and rationale for identification and selection of the interview questions and procedures are provided in Appendix C.

Analyzed using the same process as described previously, the second round of interviews produced 104 non-repetitive and non-overlapping statements. They described a variety of strategies used in the sessions and included experiences with and opinions about attendance and relationships with other learners and the leader. This round produced specific, detailed information about the types of activities the learners experienced, learning activities the learners considered beneficial to them in other courses, characteristics and interactions with other learners and the leader, feelings and reasons for attending, and likes and dislikes about the developmental mathematics course.

Final Round Learner and Leader Interview Procedures

The third and final interview questions were developed to investigate in broader, more summative terms: study strategies to be used in future courses, the importance of the SI program to successful completion of the course, characteristics of group and leader dynamics, learners' satisfaction with SI learning experiences, and recommendations for future learners, leaders, and the college with reference to the program. The final learner interview and rationale identification and selection of the interview questions are provided in Appendix D. The final round of learner interviews was conducted only after the students had completed all coursework, including the final exam. The results from the interviews of the ten learners were analyzed, producing 105 non-repetitive and non-overlapping statements. They described study strategies the students felt they learned, study strategies they felt they could use in the future, the importance of attending SI, attendance influence on performance, group dynamics, and suggestions and recommendations for future learners, leaders, and the college in reference to SI.

The second and final leader interview compared descriptions from leaders to those of learners. This comparison made similarities and contrasts in leaders' expectations, and learners' interpretation of experiences easier to observe. For this reason, the final leader interview protocol closely reflected that of the third and final learner interview protocol and was conducted only after all learner interviews were completed. The information gathered from the leader interviews was used to add contextual details to the learner descriptions. The final leader interview protocol and rationale for the identification and selection of the interview questions are provided in Appendix E.

Once all interviews were completed, transcribed, and analyzed for their descriptive statements, those from all three rounds of learner interviews were grouped into meaning units. Certain statements were repeated by many learners and other statements were made by only one or two learners. However, all statements were treated as equally important. The learners who made each of the statements and dates that the statements were made were also recorded.

Structural descriptions that detailed the motivating factors for attending the session and textural descriptions that explained what happened in the SI session were written for each of the meaning units (Creswell, 1998). Both descriptions were used to construct the overall description of SI learning experience that is detailed in Chapter Four. Pseudonyms were used to ensure confidentiality. In addition, the exact wording of the learners' responses was used from the interview transcripts, whenever possible, with the exceptions being the replacement of vague pronouns or references and the removal of any specific references that would jeopardize confidentiality.

While constructing descriptions of the learners' motivation to attend SI sessions and learning experience, it was necessary to include divergent perspectives and to control my own personal biases (Creswell, 1998). Accomplishing both processes required reflecting on the themes from the research bracketing exercise completed before the interviews. The complete, written description, including personal themes, is provided in Chapter Four. Whenever learners' themes were consistent with personal themes, transcripts of the learners' comments were reviewed to ensure that they reported what students actually intended, not personal beliefs held by the interviewer.

Data Triangulation

The community college under study provided these institutional data related to developmental mathematics courses: placement test scores, final course grades, and actual SI session attendance records. This institutional research targeted all students participating in SI sessions for these courses.

Data used to triangulate findings that originated from the interviews included self-reported attendance as compared to actual attendance, final course grades for those who participated in SI as compared to those who did not (see Table 6), and self-reported final course grades. Interviews with leaders were used to compare leader and learner perspectives of SI. Further, Multiple Intelligence (MI) profiles of the ten learners were examined to determine if there were any discernible patterns (see Table 4). Profiles of the eight leaders were also examined to determine any discernible patterns (see Table 5).

Institutional data provided a composite of the population under study. In further examination of the data, 28 learners or 25 % of the students enrolled in Pre-Algebra opted to attend at least one SI session; 32 learners or 27 % of the students enrolled in Beginning Algebra chose to attend at least one session. Institutional data from MAT0012 indicated that students who attended SI sessions had an overall course GPA of 3.1 as compared to a 1.4 course GPA for students who did not participate.

Moreover, if the two populations are not separated, Pre-Algebra had an overall GPA of 1.8. SI learners had a 50 % success rate as compared to a rate of 29 % for learners who did not attend. If the two populations are not separated, the course had a completion rate of 34 %. Students who attended SI sessions for Beginning Algebra had an overall GPA of 2.6 as compared to a 1.9 course GPA for those who did not participate.

If the two populations are not separated, Beginning Algebra had an overall GPA of 2.0.

SI learners had a 50 % success rate as compared to a rate of 37 % for learners who did

not attend. If the two populations are not separated, the course had a completion rate of

41 %.

Table 6. Population Summary of SI Participants Versus Non-Participants

Grade Distribution of all SI Learners during Spring 2005

	A	B	C	D	F	W	WP	WF
Pre-Algebra: MAT0012C	7	4	3	0	0	5	8	1
Beginning Algebra: MAT0024C	4	4	8	0	0	3	12	1

Grade Distribution of all non– participants during Spring 2005

	A	B	C	D	F	W	WP	WF
Pre-Algebra: MAT0012C	7	3	15	3	5	18	19	16
Beginning Algebra: MAT0024C	4	14	14	2	4	14	25	9

A, B, C, D, F, W, WP, WF are the letter grades that a learner must receive in Pre-Algebra or Beginning Algebra.

These descriptive data paint a picture of how important retention strategies need

to be to this community college. These ten courses were randomly chosen to have SI

associated with them. The success rates were lower than those the institution reported for

the previous year: 50 % in Pre-Algebra and 43 % in Beginning Algebra.

Finally, member checks verified the interpretation of the learners' experiences

both during and after the interviews. At the conclusion of each interview, main ideas and

statements made by each student were verified and/or clarified as a safeguard against any misinterpretation. After the initial analysis and description of student experiences were completed, several participants (learners) were contacted to verify results. All ten learners were contacted, available, and willing to participate in verification.

During the final verification, students were contacted by telephone and asked their preferences in regards to reviewing the interviewer's findings. No learner indicated his or her statements had been used inappropriately or inaccurately. The learners confirmed the interviewer's interpretations of their experiences, descriptions, and themes.

Summary

This phenomenological study was conducted in two types of developmental mathematics courses: Pre-Algebra and Beginning Algebra, with which Supplemental Instruction was associated. The interviewer's experiences with mathematics education, as a tutor and student at the community college, and as a developmental mathematics faculty and SI faculty liaison were bracketed.

Ten learners who were enrolled in the courses and attended voluntary SI sessions were interviewed three times throughout the semester. The transcripts of these interviews were distilled into a set of non-repetitive and non-overlapping statements that were used to construct a complete description about learner motivation to attend SI sessions, students' learning experiences learners in the sessions, and students' feelings about these experiences. In addition, eight leaders associated with these sessions were interviewed twice.

CHAPTER FOUR:

DATA ANALYSIS

An essential part of a phenomenological approach to qualitative analysis is the concept of bracketing. Bracketing, or epoche, "allows the experience of the phenomenon to be explained in terms of its own intrinsic system of meaning, [and] not one imposed on it from without" (Merriam, 2002, p. 94). Or, according to Creswell (1998), bracketing is useful when the researcher reviews and sets aside his or her own prior experiences and preconceived ideas about the phenomenon to be studied to better understand it through the lived experiences of the participants.

Thus, the interviewer's experiences with and assumptions about SI were fully described and involved the following: being in high school mathematics education; being a tutor and a student at the community college under study; and being a developmental mathematics faculty, and a SI faculty liaison.

<u>Research Bracketing</u>

Reflecting on my experiences that preceded this research, I have found some personal themes regarding my own learning. First, my positive experiences have made me feel comfortable, motivated, successful, driven, confident, and addicted to learning. My negative learning experiences have put doubt in my own ability, given me reason not to care or try, bruised my ego, made me feel frustrated, and left me discouraged. These

experiences influenced my decision-making about how much effort or motivation to expend to achieve my goals. Something as small as a label on a class, such as *honors* or *college prep* (CP) had a huge impact on my own personal success. When I did well, I wanted to continue to do so because I was driven by success. When I struggled, I reached out for help, but often times I just didn't care. I would temporarily abandon an idea because of a bad learning experience.

The second theme that emerged was about study skills. In mathematics, I was not taught them until my junior year of high school. My tutoring experiences demonstrated that several of the learners were never taught how to study mathematics either. There seemed to be a "how to study" learning curve. Once I knew how to get organized and use my textbook, notes, homework, and other assignments, I decreased study time before a test. I was learning to retain the information rather than learning to dump the information back on a test. This theme was further emphasized when, as a tutor, I discovered that some students didn't know how to study.

Not belonging to a learning community was another theme that presented itself in my bracketing. The community college that I attended attracted all types of learners. For example, some students had personal commitments that restricted the time they dedicated to classes. Unfortunately, many students did not have time for campus life or for other students they were taking courses with, when I was a tutor. The students didn't even know that others in the lab were in class with them. Some of the students who were in the lab were working on the same assignment, and I suggested that they work together. Many times after six weeks or more into the term, they did not recognize one another.

The fact that learning communities increase success rates was never a thought in these students' minds. This theme, once constructed, yielded another.

As a peer-tutor, I learned how to get students to explain problems to one another. I also was amazed how many students responded to the idea of having a group. They had such different backgrounds and personal lives, but they seemed very comfortable interacting with one another and discussing mathematics. We had fun; we had our own group or clique. Students would say when they left, "See you next week," or "See you Wednesday." They seemed to like the routine of having a community of learners. Many of them were surprised to be having so much fun learning the mathematics content.

In conclusion, I disclosed my personal assumptions and themes related to motivation to attend SI and learning activities. These themes represented my experiences both as a learner and as a leader. My perception of these experiences was influenced by my own multiple intelligences, learning styles, and preferences. I was motivated by learning experiences, peers, teachers, the ability to use study strategies, and learning communities. Describing, reflecting on, and summarizing my prior learning experiences in mathematics, tutoring, peer-learning, SI, teaching, and the community college helped me understand the experiences of learners in this research.

Data Analysis Procedure

The primary purpose of this phenomenological study was to describe learners' motivation to attend supplemental instruction sessions for developmental mathematics courses at a community college and perceived learning experiences. Perceptions from

leaders were comparatively drawn and used to add contextual information to learners' interview statements.

The interviewer recorded and transcribed, verbatim, the raw data, from the interviews with the learners and leaders. Subsequent to transcription, data were analyzed using a modified version of the Stevick-Colaizzi-Keen method, often employed in phenomenological studies (Creswell, 1998, p. 147). In applying this method, sequential steps were followed:

1. The interviewer's experiences with SI were fully described.

2. Interview transcripts were examined to identify statements that described learner motivation to attend SI sessions and their associated experiences in these sessions. These statements were organized into a list of non-repetitive, non-overlapping statements, a process known as horizonalization of the data (Creswell, 1998).

3. Non-overlapping statements were grouped into "meaning units" and textural descriptions (Miles & Huberman, 1994; Rossman & Rallis, 2003), which described what happened in the experience, including verbatim examples (Creswell, 1998, p. 150).

4. Textural descriptions were examined and different perspectives and possible meanings were explored to more fully detail students' SI experiences.

5. An overall description of the meaning and essence of student motivation to attend these developmental mathematics SI sessions, and their subsequent learning experiences was derived.

6. This process was followed first for the interviewer's account of the experience and then for each participant's (Creswell, 1998).

First Round Interview Data Analysis Procedure

The ten learners were randomly contacted within a two-week period beginning the second and ending the third week of SI sessions. All learners voluntarily answered all interview questions. The initial learner interview protocol and the rationale for identification and selection of the interview questions are provided it in appendix A. The raw data from the interviews were audio recorded and transcribed verbatim for each participant. Before any specific analysis began, data was processed four times: Actual interviews were conducted; a complete transcript of each interview was made; the transcription log of the interviews was verified for accuracy; and a second reading was done to get a sense of the whole.

The data were analyzed using the phenomenological approach described by Creswell (1998). Such an analysis employs the methodology of reduction and analyzes specific statements and themes. In this method, statements in the learners' interviews that describe learning activities and experiences in the SI sessions were targeted. This was first done for the individual students and then for the group as a whole. These statements were organized into a list of non-repetitive and non-overlapping comments that were all considered to have equal value. This process is known as "horizonalization" of the data, which results in a complete listing of all descriptive statements (Creswell, 1998, p. 147).

Analysis of the 10 learners' interviews produced 133 non-repetitive and non-overlapping statements. They were grouped into 10 categories of emerging themes or

meaning units for further investigation in the second round of interviews. Descriptors included characteristics of good learning experiences, feelings about good learning experiences, characteristics of bad learning experiences, feelings associated with bad learning experiences, learning activities in the sessions, activities in the developmental mathematics classroom that detract from learning, motivation to attend sessions, reasons to discontinue sessions, characteristics of the leader, and additional benefits of and ideas about the program.

Second Round Learner Interview Data Analysis Procedure

This round of learner interviews was conducted during the sixth and seventh weeks of SI sessions, just before the withdrawal deadline for the course. Interview questions were structured to gather additional detail on the motivation to attend learning experiences and types of experiences and further investigate the meaning units generated from the initial interviews.

The questions were developed from the learners' perspective and provided information about the following: learning activities in the program, learning activities students used or planned to use in future courses, interaction with other group members, characteristics of leader, feelings about attending the session, reasons for attending, and likes and dislikes about developmental mathematics courses and the sessions associated with them. Some questions were repeated in the second round because learners had acquired more learning experiences on which to base responses. The second learner interview and rationale for identification and selection of the interview questions and procedures are provided in Appendix C.

Analyzed using the same process as described previously, the second round of interviews produced 104 non-repetitive and non-overlapping statements. They described a variety of strategies used in the sessions and included experiences with and opinions about attendance and relationships with other learners and the leader. This round produced specific, detailed information about the types of activities the learners experienced, learning activities the learners considered beneficial to them in other courses, characteristics and interactions with other learners and the leader, feelings and reasons for attending, and likes and dislikes about the developmental mathematics course.

Final Round Interview Data Analysis Procedures

The third and final interview questions were developed to investigate in broader, more summative terms: study strategies to be used in future courses, the importance of the SI program to successful completion of the course, characteristics of group and leader dynamics, learners' satisfaction with SI learning experiences, and recommendations for future learners, leaders, and the college with reference to the program. The final learner interview and rationale identification and selection of the interview questions are provided in Appendix D. The final round of learner interviews was conducted only after the students had completed all coursework, including the final exam.

The results from the interviews of the ten learners were analyzed, producing 105 non-repetitive and non-overlapping statements. They described study strategies the students felt they learned, study strategies they felt they could use in the future, the importance of attending SI, attendance influence on performance, group dynamics, and suggestions and recommendations for future learners, leaders, and the college in reference to SI.

The second and final leader interview compared descriptions from leaders to those of learners. This comparison made similarities and contrasts in leaders' expectations, and learners' interpretation of experiences easier to observe. For this reason, the final leader interview protocol closely reflected that of the third and final learner interview protocol and was conducted only after all learner interviews were completed. The information gathered from the leader interviews was used to add contextual details to the learner descriptions. The final leader interview protocol and rationale for the identification and selection of the interview questions are provided in Appendix E.

Once all interviews were completed, transcribed, and analyzed for their descriptive statements, those from all three rounds of learner interviews were grouped into meaning units. Certain statements were repeated by many learners and other statements were made by only one or two learners. However, all statements were treated as equally important. The learners who made each of the statements and dates that the statements were made were also recorded.

Structural descriptions that detailed the motivating factors for attending the session and textural descriptions that explained what happened in the SI session were written for each of the meaning units (Creswell, 1998). Both descriptions were used to construct the overall description of SI learning experience that is detailed in Chapter Four. Pseudonyms were used to ensure confidentiality. In addition, the exact wording of the learners' responses was used from the interview transcripts, whenever possible, with the exceptions being the replacement of vague pronouns or references and the removal of any specific references that would jeopardize confidentiality.

Of the ten learners in the study, seven successfully completed their courses. Students who did not complete their course earned a grade of *WP*. All three agreed to be interviewed even though had been technically withdrawn from the course. All were very happy with the SI sessions. In fact, Veronica and Ernesto commented on the changes they were going to make when they attempted the course again in the fall term. Mike, on the other hand, gave no indication that he was going to try to retake the course.

At the beginning of the final interview, when asked about his progress in other classes, Mike said that he did not have a chance to go online to check his grades. Regarding his math grade, he replied, "I think I got an *A*, but I don't believe I did very well on the competency exam, so, [pause], I guess I didn't pass that class again, but I haven't checked for sure."

Also of importance was these students self-reporting of the number of times they attended the sessions and the distractions associated with missing a session. Veronica said she went to almost all sessions during the scheduled time and to a couple outside the regularly scheduled session. During the second interview, she said:

> I think I only missed twice and that was because of personal issues and schedules and stuff like that. One other time the leader was out on a personal leave as well. She was out of town. Right now I'm working only three days a week, but I'm working two jobs. I'm working a full-time job and a part-time job back-to-back of each other.

Veronica expressed the difficulty of splitting her time between work, school, and family. "I have a young child at home, you know." Institutional data on the actual number of times she attended session supported her statements.

Ernesto also said he went to almost every session, except when the portable was removed from campus without his knowledge. He was disappointed that no one shared this news with him because he came to school early to attend the session. He missed a couple of times because his workload as cook at a major resort began to redirect his focus. He shared the following: "You know, the sessions worked; it's just my fault that I withdrew from class. And working and not doing my homework kept me from being successful in school." Again, the institutional data supported Ernesto's statements about attendance.

In his interview, the leader, Justin, spoke about attendance: "It was frustrating to lose our classroom; we had to find another place to meet." Justin believed that Ernesto "learned an important lesson; he learned how important out-of-class study and homework [are]."

Mike indicated that he attended every session. Attendance records substantiated his account until the last month of classes. Mike mentioned that he "worked long, crazy hours on the job sometimes." Steve, another learner in his group, shed some light on what occurred. He made these comments: "I don't know where Mike has been; I think he fell off the wagon [in reference to group members and attendance]. I know he said he was busy at work."

Compiled Analysis

Once all interviews were completed, transcribed, and analyzed for their descriptive statements, the comments from all three rounds of learner interviews were grouped into meaning units. While some remarks were repeated by learners and other statements were made only by one or two learners, all were dated and treated as equally

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important.   Structural and textural descriptions about motivation for attending the sessions and experiences acquired from them were written for each of the meaning units (Creswell, 1998). These descriptions were used to construct a composite of motivation and the program's learning experiences.

To really be able to understand the learners' motivation to attend SI sessions and the learning experiences, more must be known about what learners' perceive as being good or bad and about experiences make students feel. Understanding these perspectives is crucial.

Perceptions of a Good Learning Experience

The learners mentioned that there are several components that create a good learning experience. First, all ten learners mentioned the teacher as being the most important contributor to a good learning experience. They stated that the instructor needed to be a good, supportive teacher who cared about students and wanted to see them learn. The learners wanted a teacher that could communicate with the students.

"I like it when I ask a question and they answer it and I get it," Steve stated. "I think it is important for the teacher to take the time to make sure I understand exactly what is being covered," Veronica remarked. A couple of students, Ernesto and Betty, remembered a past experience where "she [the teacher] adapted to my learning style." The teacher was the key to a good learning experience in the past.

Another group of learners, Mike, and Judy, echoed Jasmine as she explained, "I want a comfortable place [environment] to study, so that I can just focus on learning." A good learning experience is "excelling in a class like my reading class last semester," Mike divulged. These three learners mentioned, "What really makes me feel good is

when I learn it. Learning is important." The students mentioned that these good learning experiences made them feel confident, excited, happy and satisfied. Betty said, "I feel excited about learning, and now I know I can do anything."

Perceptions of a Bad Learning Experience

A bad learning experience "would be the class I dropped last semester which was my math class," Mike explained with laughter. Some of the negative influences that learners mentioned affecting their poor performance in their respective courses were "the professor," "a bad tutor," a "negative learning environment" including negative students, "poor test results," "outside of school influences," or "just not getting it." Continuing, Mike said, "It was a very bad experience; I was very frustrated to find out that I had to take the whole class all over again."

Isabella reiterated Mike's statement: "It is one thing being forced to take something [state mandated developmental mathematics class] that I didn't like, but you know, it is even worse because I took four classes that semester and I got *A's* in all my other classes and failed math. I know I withdrew, but it felt like I failed. So I just thought, 'I know I am not going to pass; I am just going to have to face the consequences.' That just killed me to quit because I am not a quitter. I was petrified to try again." There are outside pressures that put extra pressures on learner to succeed.

For example, another learner, Denise, said, "I did not want to let my family down." She continued, "I felt helpless. I just didn't get it." Understanding students' perceptions of good and bad learning experiences is necessary to understanding the significance of the learners' statements about motivation.

<u>Research Question 1: What Are the Underlying Themes Regarding Learner</u>

<u>Motivation in Attending SI Sessions That are Associated with the</u>

<u>Community College Developmental Mathematics Courses</u>?

All learners indicated they were motivated in one way or another to attend the sessions. The themes on motivation came from ten diverse learners in five different courses of the population, which was ten developmental courses, either Pre-Algebra, MAT0012C or beginning algebra, MAT0024C, at a community college in Central Florida. Eight themes emerged regarding the motivation to attend the SI sessions associated with developmental mathematics coursework and subsequent attendance of them:

1.   Positively influenced other parts of the learners' lives.

2.   Gave learners confidence in their ability to do mathematics.

3.   Provided learners extra practice and study techniques.

4.   Gave learners a comfortable interactive atmosphere.

5.   Associated with course learners perceived as difficult.

6.   Was seen as a means to make a good or a respectable grade in the course.

7.   Enabled second and third attempt learners to see that they needed more help and increased their desire to pass.

8.   Strengthened learners' resolve to commit to the entire semester of instruction.

The structural description of the experience is summarized as: motivation to attend the initial and subsequent SI sessions involves desire to participate in a positive learning community, increased confidence in mathematics ability, opportunity to practice

study skills, need for a supportive atmosphere and climate of achievement, course difficulty, course grade, available help, and learner resolve to complete course.

Positively Influenced Other Parts of the Learners' Lives

All ten learners indicated that they went to the SI sessions because they felt that they were having a positive experience. Eight learners agreed with Ernesto when he said, "I know that attending the SI sessions helped me in this class, but also it has helped me learn to study better, to be a student." Isabella said, "It [the SI session] helped me get an *A* in my other class using flash cards that I learned [about] here." During the leader interviews, Sebastian concurred that SI made a positive change.

> Julie: Do you believe that the student participation in the SI session influenced their performance in the course?
>
> Sebastian: [O]ne student, she did pretty good at the beginning by herself, but she had taken this class twice actually. She started pretty good and then she started getting low grades, and then she started coming to the sessions. And she was kind of like negative about it, about the class. And you know, she was all negative all the time, and after a while, she got a perfect score on the state test and everything.

Eight leaders believed that the learners were motivated by seeing a positive change in their success, whether the change was doing well on a test or just being able to explain a problem during a SI session. Another consistent belief was that the learners may not have passed the course, but both learners and leaders agreed that students came to the initial and subsequent sessions because they were getting something out of attending.

One leader, Marissa, described this positive influence about her SI learner, Veronica. Here is an excerpt from Marissa's final interview:

Julie: Did the students learn what you expected them to learn?

Marissa: Yes and no. I expected [Veronica] to perform a little bit better in the class, but she's been out of school for like twenty years and I guess that if you go twenty years without math it can't be fixed in one semester. But she may not have gotten the best grade that I would have expected for her or hoped for her to get. But, as far as at the end of the sessions [by the end of the semester], she did start getting the algebra a bit more and she did start to comprehend. So I think that it was good.

In Veronica's case, the positive influence and motivating factor was getting back into the mode of being a student and learning how to learn. Here are Veronica's words to describe her reasons for attending.

Julie: What helped your learning best?

Veronica: I think getting different perspectives from different people. You know, everyone's learning style is different and it's good to be kinda like, well, take a little bit of this and a little bit of that from each person and apply it to oneself and run with it.

Julie: How did attending the sessions make you feel?

Veronica: I think they gave me a boost in my learning the subject and it gave

                me another avenue to pursue, in regards to getting additional help

                if I ever did need it. So, you know, that's how it helped me [by

                giving me] the feeling that it was there to help me tap into learning.

In reflecting on his motivation for attending the initial and subsequent sessions, Garth

stated, "It has opened many doors for me because I learned how to study; I wonder why I

waited so long to try."

Gave Learners Confidence in Their Ability to do Mathematics

Again, all ten learners expressed that they were motivated to attend because the

session was building their confidence or they had a change in attitude about the class, or

they were having fun learning. More specific than positive influence, this category

referred to building confidence in the developmental mathematics course the learners

were taking. There were two learners, Isabella and Betty, who believed their background

in mathematics were very weak for different reasons. Both thought they would not be

successful in college or math, ever! During the first interview, both said that their math

experience with SI was positive. Here is an excerpt from Isabella's first interview.

Julie: Describe a good learning experience.

Isabella: Well, actually I didn't like math before and I never did well in

                it….Everything was confusing to me when I finished high school I

                went to school for computers, because I was always petrified of

                math. And it [SI] has changed my attitude. Just the other day,

                Claudia [her SI leader] came to me and said, 'Oh, you're actually

excited about doing some math problems' and was I [said] 'yeah.' Betty made these comments:

Julie: Can you describe for me a good learning experience?

Betty: A good learning experience…when I guess you have all the materials you need to learn all the things you need to know for each course, and um, I guess that really helps out because on my first test I got 104 %.

Julie: How does a good learning experience make you feel?

Betty: I was home schooled. [Because] I didn't do well in school, I didn't think I would do well in college. I got the extra help from Patrick and it made me feel like I could do it [math] and I didn't feel stupid anymore.

The other eight learners had similar stories about how much fun they had in sessions and expressed surprise that they were "really learning mathematics" and were "having fun" doing so. Four learners, Denise, Jasmine, Judy, and Garth, were surprised with their performance in the course. Garth stated, "I am doing better than I thought I would, even more because I like math now. I am actually good at it." Veronica and Steve commented, "I look forward to it every day." Judy said, "It's kinda like an addiction." Isabella, Steve, and Judy agreed with Betty's statement: "Attending the sessions just makes me feel good."

Upon examination of the transcriptions for the eight leader interviews, six of the eight leaders reported "I think that it [attending the SI session] built their confidence." All eight leaders reported that they had fun with the learners who attended the sessions.

Provided Learners Extra Practice and Study Techniques

All ten learners made statements about how they came to the sessions to "get extra practice" or "to make sure I get it" or "to learn it." Veronica has her own reasons for believing that she needed extra practice. She said, "It's been 29 ½ years since I've used this kind of math so I need to go get all the extra practice and support I can find."

Seven learners said that they wanted to "understand" what they are learning, "not just work the problems." Four learners, Isabella, Steve, Jasmine, and Betty, provided more evidence for motivation to attend because of extra practice when they said they would even go to the sessions when the material was easy. "I got it, but I didn't want to miss anything [in the session]," Betty said.

All eight leaders substantiated the theme that extra practice was a draw for the learners because they "asked for extra practice problems in every session." "They told me, 'The session … filled in the missing pieces from doing the homework and stuff from class,'" Sebastian said.

Gave the Learners a Comfortable Interactive Atmosphere

All ten learners believed that a comfortable, free atmosphere was a very important motivating factor. The atmosphere of the SI sessions was invariably described as "comfortable" and "free." Learners operationally defined the atmosphere or environment as the interaction with the leader and their peers.

They mentioned that there was "a lot more interaction with their peers in the SI session" than in the classroom. They were "very excited" about the "one-on-one attention" they felt they got from the leader. A few students mentioned that part of their motivation to attend was that "the session is free; why not find out if it helps?"

Judy added, "I would be stupid not to try it." Garth stated, "It is a different atmosphere, kinda like another class within a class, but more personal with a lot of energy." Jasmine asserted, "It is a low pressure environment with everyone working towards a common goal of being successful. You know we're kinda like a family."

Leaders also described how the interaction between the group of learners and themselves needed to be "comfortable" or "friendly."

Atmosphere was divided into two subcategories in terms of interaction: leader interaction, with the learners on a personal basis and group interaction working toward a common goal.

Leader interaction.

Eight interaction points were identified by the learners. First, the leader needs to be like a "coach," a "guide," or a "cheerleader." He or she must be "supportive," "flexible," "nice," "helpful," "caring," and "patient." All ten learners described their current leaders as "supportive."

Betty said, "He, [the leader] always gave me verbal attention. He would say, 'Very good, way to go, Betty,' and it made me feel better about my skills. It made me feel like I wasn't so bad . . . . I guess that's what I needed maybe, you know, a little motivation like coaching."

Learners believed that the leader was their "friend" or "on the same level." Denise remarked, "I understand more with Aurora's [the leader's] help, because she's more my age group." Nine out of the ten learners echoed that thought. Mike liked that the "leader attends class with me so he [the leader] knows what we are doing in class. He take notes and goes to class just like us."

All ten learners said the leader needs to create a "comfortable environment" and make it "casual" and "constant interaction." Steve said, "I like to go to the sessions because the leader made me feeling good about being myself." Eight learners reported that they felt "very comfortable asking questions" during the sessions and they "always had all of their questions answered before leaving."

Learners wanted the leader to have content "knowledge" and the "ability to explain things" so that they could understand. Eight of the ten reported, "the leader explains things well." Garth added, "I like it when Isaac [the leader] explains the problem and then I work on the problem or formula, and I get the formula, and it is gratifying that my answers match the answers in the back of the book because of Isaac's help."

Denise, Ernesto, Betty, and Veronica wanted the leader to help them "learn how to think" through the problem. Ernesto explained, "I liked it when I made a mistake and Justin [the leader] didn't just fix it for me. He made me find my mistake and explain it to him."

Isabella, Mike, Garth, Betty, and Veronica thought that the leader was "respected" and "admired." Isabella described Claudia [her leader] as a role model student. "She

takes notes and everything. I really admire her work. She is awesome, and I am trying to learn as much as I can from her."

Six of the learners wanted the leader to "enjoy" helping them, or to be "enthusiastic about helping." Steve exclaimed, "There is nothing worse than going to get help from someone who doesn't want to be there." His leader, Patrick, said, "I really get excited when I see 'the spark' for the first time. It makes me want to help."

Six of ten learners stated that they didn't want the leader to "threaten" or "embarrass" them. Every learner interviewed said that they did not want the leader to "make me feel stupid."

Group interaction.

Such interplay was important as seven of the 10 learners listed it as a reason for not returning to the session. There were five different themes that developed about groups and motivation. The first two were negative and the last three were positive.

The first complaint was about a "bad" or "negative" student attending the session. Isabella explained her "frustration" when a student came to her session: "There was one girl who was really negative. I didn't like it when she came. I didn't like the negative mindset. I didn't enjoy it and I got frustrated with her because she only came every once in a while and when she came she blamed everyone but herself."

Six other learners echoed Isabella's thoughts in their interviews. Mike added, "I know the girl [negative student] won't last. She is just coming to tell the professor she went." These six learners mentioned how "annoying" it was to have a negative student attend the session. Steve said, "That's why I really like that the program is voluntary; only the ones [who] want to succeed and work for it come."

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The second negative statement in terms of the group interaction or the group study session came from Mike: "I hated the way we reviewed for the competency exam. I felt like I was cramming, not learning. I did so well throughout the entire class. In fact, I had an *A* going into the comp exam. I failed, so I got a *WP* in the class. That was very frustrating for me. I failed the course for a second time." Mike's was the only negative comment about how the sessions influenced performance on the competency exam. All other learners made positive comments about the sessions' influence on the competency exam.

The third theme was positive with eight learners describing their group interaction as "very supportive," "friendly," and "we all get along." One group of learners built camaraderie. The leader [Isaac] said, "It was really cool because my group had a head-start building a rapport, because two of the students were siblings." Seven students agreed with Betty's description of how group interaction worked. Betty said, "It is working out quite well, we all helped each other." Jasmine and Judy wanted "everyone to be successful." Jasmine said, "We care about each other. We're like family."

Nine learners shared this opinion, which emerged as a theme: I liked the "small group" with learners attending the sessions who were "all on the same level" and "asking the same questions." All eight leaders agreed and echoed Nitin's comment from his final interview: "They are always working together. They help each other answer problems." Similarly, the leader, Justin, said, "I am just the facilitator."

The final theme was that working as part of group changed learners' attitudes. "I enjoyed really talking about how to do it and I learned from watching other students make mistakes," explained Steve. "I really enjoyed the competitive nature of the

sessions. We would sometimes do board races depending on how many people came,"

Betty asserted. Isabella said in a previous interview that she did not work well in groups.

Thereafter, she reported, "I can't believe that I am saying this, but I actually have fun in

the group sessions."

Denise, Steve, Jasmine, Judy, and Betty all thought that the group members

encouraged each other to attend. For example, Betty made these comments:

Julie: Tell me about the experiences you are having with the group of
            students that attend the sessions with you?

Betty: Everyone seems to be on the same page, I think. And people
            [who] attend all the sessions are doing well, I believe, with their
            grades . . . . The regulars do well, you know. We'll be like see ya
            Tuesday or like see ya Thursday when we see each other outside of
            class, you know... I think we have fun in there…

All learners agreed positive changes, confidence building, extra practice, and

atmosphere motivated session attendance, but these were not the only motivating factors

described by the learners. Some learners mentioned other factors that were not discussed

by all students.

Associated with Course Learners Perceived as Difficult

Eight of ten learners mentioned that they thought math was their "hardest

subject." Isabella said, "I know that the class is getting tougher." Veronica said, "I know

I need help, because math doesn't come easy for me." All eight learners had variations of

those quotes. Only two leaders, however, mentioned the difficulty of mathematics as a

motivational factor for students' attendance.

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Isabella was very concerned that the college understand the difficulty level, especially for women.

Julie: What suggestions would you make for the future of this program for the college?

Isabella: They should definitely have it [SI] in all math classes because there is a problem with people and math, you know. And everybody I've spoken to, they [agree]. Math is a problem. One girl that's in my microbiology class she earned an *A* on every chapter test she's taken in there. [But] in math, she had issues with it. I think that a lot of older students, such as myself, and women, especially, have a hard time with math and maybe we should be a target of this particular program. . . . . [W]e are coming back and were afraid of it [math]. We need extra help…especially in the first two levels.

Was Seen as a Means to Make a Good or a Respectable Grade in the Course

This category was supported by nine of ten learners in terms of motivation. "I am motivated because I went from failing last semester to earning a *B* [learner actually earned an *A*] this semester!" Judy exclaimed.

Another learner, Steve, stated emphatically, "I am coming because I don't want to screw up. I want a good grade. I'm here to learn." Garth and Denise decided to come to the first session because of their SI leader's presentation the first day. Denise said that her leader [Aurora] told her, "Pretty much everyone that comes to my session will most likely pass the state competency test and the class." So Denise said, "That's why I went."

Enabled Second and Third Attempt Learners to See that They Needed more Help and Increased Their Desire to Pass

Three learners, Mike, Denise, and Judy, shared that they were coming to the session because this was not their first time taking the class and they "didn't want to take it again." Judy said, "When I failed last semester, I felt really discouraged, so I am trying everything to make sure I am successful this time." Isabella agreed, saying, "I know that the session changed my life last spring. This semester I rearranged my schedule after the first day of class by going to see the dean to get into a class with SI." Isabella explained her first week of classes was hectic. She adjusted her schedule to make sure she was in a class with a SI: "I knew the second course would only get harder, and I didn't want to have to retake it."

Strengthened Learners' Resolve to Commit to the Entire Semester of Instruction

All ten learners said that they learned more than they expected to from attending these sessions. Jasmine's final interview sums up the majority opinion for this question.

Julie: Did you learn what you expected to learn by attending the
            sessions?

Jasmine: I learned more. I got more out of this then I was really bargaining
            for. You know, [SI] made me understand math. It made me go
            into it more than I usually would.

During her final interview, Judy was asked the following:

Julie: Did you learn what you expected to learn from attending the
            sessions?

Judy: No, because when I first started, I didn't think they would actually

help me. So [when I took the competency exam] I was very happy

when the teacher told me, 'You passed with a 97 %.' I was

so happy. Too bad Isaac [her leader] wasn't there because I would

have kissed his feet or something.

All learners indicated that they got more out of the sessions than they thought they would.

Research Question 2: From Perspective of Learners, What are the Underlying Themes Regarding Their Learning Experiences in SI Sessions that are Associated with the Community College Developmental Mathematics Courses?

Learners in this study reported similar experiences and activities in their SI sessions. Despite the diverse backgrounds of learners and their participation in different SI sessions with different leaders, these nine themes were generated:

1.   Asking questions.

2.   Participating in group study.

3.   Learning different ways to study mathematics.

4.   Using step-by-step guided problem-solving techniques.

5.   Completing several repetitions of similar mathematics problems.

6.   Focusing on specific weaknesses and learning styles.

7.   Learning how to use tricks, mnemonic devices, and flash cards.

8.   Competing against other participants.

9.   Learning strategies to help with test anxiety or math anxiety issues.

These themes emerged from 30 student interviews with 10 learners from six SI sessions. No other learning activities were described. The structural description of the lived experience in these sessions is summarized as: learning activities in SI sessions involve questions, interaction, study skills and learning strategies, problem-solving with repetition, cooperative games, and anxiety-reducing techniques.

The experiences described by the learners produced consistent descriptions of feelings, benefits, and challenges they experienced while attending the SI sessions. During the third interview, these learning experiences were referred to as study strategies or study techniques.

All participants [learners] reported five main learning activities or study strategies they participated in during the SI sessions: asking questions, working in groups, learning how to study, using guided step-by-step problem-solving, and doing repetitions of extra practice problems.

Isabella summarized these activities in her first description of SI sessions associated with developmental mathematics:

This program has really helped me because I am not afraid to ask questions. I actually like working in groups now. I appreciate all the extra help and practice I get. I learned how to study and use note cards. Also, I learned how to follow the problem-solving process. I know more about myself as a learner [in terms of learning style].

Isabella was the only student with prior SI experience. She already had two prior experiences with SI session. The first time she did not successfully complete the Pre-Algebra course. However, the second time she attempted the course she "went from

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failing the class to earning an *A* grade." She attributed her success to learning how to study effectively for mathematics by attending the SI sessions.

Asking Questions

Garth used these words to describe his SI session: "[It] always began with, 'Does anyone have questions?' and we always did." All ten learners mentioned that the session always began answering any question that they might have from the last class meeting. Ernesto stated, "I showed up and he [the leader] would help me by answering my questions." Isabella said, "I would already have my questions ready for when we walked in the room."

All ten learners and eight leaders agreed that asking questions was a very important activity. However, when asked what study strategies would be of use in the future, not one learner mentioned asking questions. One leader, Claudia, said, "You can tell which ones [learners] come to my sessions [because] they are the only ones asking questions during class."

The second round of learner interviews captured Judy's perception of asking questions in class versus during the session.

Julie:	Do you believe that your attendance has influenced your performance in the course?
Judy:	Yes, very much.
Julie:	What types of things are you doing in the SI session that influence your performance?
Judy:	Like, I can be in the class and the teacher can explain and usually when I'm like in a large crowd, I don't exactly under…you know

I'm just kind of afraid to ask, you know? And [I am] afraid to ask

about anything I don't understand. When I go to the sessions, it is

a smaller group, and I know everybody there. I feel comfortable to

ask questions that I don't understand, and I get it explained like a

different way so I get it. You know, I didn't feel stupid because

everyone [is] on the same level asking the same questions.

All learners described feeling "comfortable" asking questions during the session and that

they "get questions answered" that they don't understand.

Participating in Group Study

All ten learners suggested that an activity used in almost every session was group-

work, whether the group consisted of several students or just a leader and a learner.

Denise explained, "We all work problems on the board together." Judy said, "We all take

turns working on the board and explaining the problem to the group." All eight leaders

listed group-work as a priority. A leader, Aurora, stated, "I want the students to be

independent learners, so I want them to interact with each other; that means they will rely

less on me." In Steve's second interview, he described a group study experience as

follows:

Julie:　　　　Are there specific characteristics of the SI session that you feel

enhance your learning?

Steve:　　　　[Because] this is my first SI, I can't say that this is exactly how it's

always going to be, but I like the fact that we can even get off topic

for a second and vent about a certain thing and why it is that like

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that . . . . [it is] not just problem, problem, problem, problem . . . .

we'll kick back and say, 'Okay, well let's get back to math.' I like

that.

Julie: Are you describing the interaction with the whole group?

Steve: Yeah, well, we are not just in their being plastic and just going for

the mathematics portion. But you know, [pause] it's [not] like

when you are in a classroom. You can almost say that the teacher

is the stereo turned on high and I'm just turned off, but in SI

everyone's got the volume on as long as it's on subject, and it

makes sense [pause]. I like the fact that we can reciprocate

loudly…You know, we can all say, 'He's right. No, he's wrong.

No, shut-up. Listen to him. You need to do this. I go it.'

Learning Different Ways to Study Mathematics

All ten learners mentioned that they were leaving the course with several different

ways to study, such as creating their own practice test, reviewing their notes, reading

their textbook, doing their homework, taking good notes, learning math vocabulary

words, and organizing both their notebooks and lives. Isabella and Veronica said, "I

learned how to use my notes to study." Denise learned, "how to review my homework."

All the other students shared the same experience related to learning how to study in

general.

All eight leaders expressed that showing the learners how to study was something

they kept modeling during the sessions. Nitin, a leader, described how he "showed the

students how to access the professor's Website to get practice tests and other related materials."

All of the learners said they were learning how to study by the second interview. Some expressed that they anticipated being able to use their new SI skills in other situations. For example, Ernesto learned "for every hour in class, I need to put at least like an hour of homework or like an hour of study in [outside of class]. I need to go over the stuff like I do with Justin [his leader] by myself."

Judy shared that she learned to make up her own problems: "I do what Isaac [her leader] does in the session and um it's helping out a lot." During the third interview, Mike mentioned that he learned to study almost as an afterthought:

Julie: Did you make any changes in your study strategies outside of the session?

Mike: No, not really. I really did it mostly in the SI sessions [long pause]. Well, you know, I did learn how to study from my book and in the future, I will go ahead and study from my book a little more.

It seemed this was the first time Mike realized that he had learned how to study. Garth added to this theme by stating, "I started working problems and using the confidence I gained from the session at home. I would give myself a thirty minute practice test to practice like an exam situation." Betty was the only student who didn't know if she would use the strategies in the future. She said, "I will have to think more about that. I really don't know." By the third interview, she, too, believed that she learned how to study her homework more effectively.

Using Step-by-Step Guided Problem Solving Techniques

Again, all learners agreed that using guided problem-solving techniques was a learning activity employed during the SI sessions. "We did step-by-step problem solving," Ernesto said. Becky described this technique during her SI session: "The leader, Patrick, would wait until we all finished each step before continuing to the next step. Even then, he waited until we all agreed before he wrote anything."

The eight leaders confirmed that they intended to emphasize problem-solving as a learning activity during the sessions. Aurora said, "I really want the students to understand that math is all about procedures and steps." Isaac concurred with this belief: "I try to get them to understand that if they don't know that steps it is virtually impossible to get a solution."

One learner, Judy, stated, "I can sometimes hear Isaac asking me what the next step is to solve the problem. When I am working on the board in the session, he is always saying 'Okay, what's next?' and that question really helps me while I am taking a test [or] working problems at home." All of the learners describe a situation similar to Judy's: "remembering the what's next" question from the session.

Completing Several Repetitions of Similar Mathematics Problems

All ten learners stated that doing extra problems in the sessions was a major part of the session. The interviews captured statements such as "We do extra practice every session," "We practice until everyone gets it,", and "It helps to keep working several repetitions."

"We make up [extra] problems to work together," said Judy. Denise stated that the activity that helped her learn best occurred when the leader "does problems on the

board and repeats everything like five times. We both then do repetitions of the problems and answers so that I can learn better."

Moreover, all leaders confirmed that they did work on creating extra practice problems during the session. Four leaders, Aurora, Justin, Marissa, and Patrick, collectively shared this opinion: "Using repetition and extra practice is very important in math."

All the learners said that they asked questions, worked in groups, learned how to study, used guided step-by-step problem-solving techniques, and repeated extra practice problems until they got it. Some students described learning experiences or study strategies that were not discussed by the other learners. Each of the study strategies mentioned was supported by at least one leader in order to validate its usage during a session.

Focusing on Specific Weaknesses and Learning Styles

Nine learners said that a focus in the session was to work on one another's weaknesses: "common mistakes," "visual interpretations," and "thought process" problems. For example, Veronica stated, "Marissa [the leader] is helping me recognize my common mistakes."

Seven learners said that their leaders focused on ways to help them, based upon their learning styles. Denise elaborated, saying, "Aurora shows me how first, because I am a visual learner." Isabella said that Claudia, her leader, "makes me work and explain problems because that helps me with hands-on type learning. Of course, this helps me think through the problem out loud too, you know."

All eight leaders mentioned that they spent time helping students focus on their specific weaknesses. Claudia, a leader, said, "I gave my students a learning styles inventory that I [found on] the Internet one day, right after a test and no one really had questions."

Learning How to Use Tricks, Mnemonic Devices, and Flash Cards

Five learners suggested that a learning activity or study skilled experienced in SI sessions was learning tricks or mnemonic devices. For example, three students, Steve, Judy, and Veronica, said that the leaders "gave us tricks to use." Isabella mentioned that the most important study skill she learned was flash cards. She believed that these were the reason she earned an *A* on her microbiology final exam.

Garth said, "Isaac was helping them learn to recognize key words—just a little trick for word problems." In fact, Isaac said that a main objective was "to get the learners to be able to do word problems and identify the key words." During the leader interviews, all mentioned they shared tricks, mnemonic devices, or flash cards as a learning activity during at least one of the sessions.

Competing Against Other Participants

Four students discussed the fun, competitive nature of the session, either in terms of games they played or grades that they earned. "We race each other to see who can get it done and correct the fastest. It's fun," Betty said. She explained that she won sometimes because the guys in her group rushed and she caught their mistakes.

Patrick, a leader, described a speed race: "We all go to the board, make up a problem and compete to see who gets it done 'correctly' [he emphasized] the fastest." Jasmine said that all semester long she was trying to get the highest grade in terms of a

competition among SI participants. She was not successful. She replied with laughter, "I did beat my brother." Judy described comparing tests scores to see "how everyone was doing."

Learning Strategies to Help with Test Anxiety or Math Anxiety Issues

The activity with the least congruence in perspectives among learners was help with math and test anxiety. When reviewing the leaders' interviews, four of eight leaders, Nitin, Issac, Justin, and Marissa, mentioned that they talked about these issues, but only two of ten learners identified them as learning activities during any interviews. Judy and Veronica were the only learners to mention these issues. Judy said that she remembered discussing "test-taking strategies." Veronica specifically stated, "I am now learning how to overcome math anxiety."

Conclusion

For the persons in this study, learning experiences in SI sessions were classified as "good" when students felt "comfortable," "good," "confident," "excited," "happy," and, most of all, "satisfied."

The underlying themes broaden our collective understanding of factors influencing learners' motivation to attend SI sessions and types of learning activities experienced in them. The analysis of eight themes in terms of motivation to attend and nine themes describing learning activities sheds light on the essence of the lived experience of learners in this study.

The essence of the experiences in terms of motivating factors was both intrinsic and extrinsic. Intrinsic motivation focused on how the learner felt after attending the

initial and subsequent sessions. Extrinsic motivation was characterized by factors such as desire to earn a good grade or perception of course difficulty.

The essence of experience in terms of learning activities demonstrated that SI sessions provided learners with a place to process and use study skills and strategies necessary for mathematics success.

Learners who participated in SI sessions associated with two developmental mathematics courses at a community college clearly indicated in their narrations that the program was an interventional strategy, which supported a climate of achievement.

CHAPTER FIVE:

DISCUSSION OF FINDINGS

Capturing learners' experiences and feelings about the motivation to attend and

feelings about learners' lived learning experiences in SI sessions is a very difficult

exercise. The complexity of learners' motivation to attend SI sessions and feeling about

the learning experiences in SI sessions cannot be separated neatly into checklists of

desirable characteristics or quantitative values as much of the literature attempts to do.

Qualitative information added valuable, contextual information about the motivating

factors of the learners who choose to participate in SI. Brookfield (2002) suggested that

faculty view their teaching practice through four complementary lenses—their

autobiographical experiences as learners, students' eyes, colleagues' perceptions, and

educational literature—to develop a critically reflective stance toward the practice of

community college teaching. This study provided a "lens" through which learners

motivating factors to attend SI sessions and learning experiences in SI sessions designed

for developmental mathematics community college students may be explored.

It seemed that learners experience the environment and activities differently on a

variety of levels. The diversity of these learners' maturity levels, cultural backgrounds,

educational background, life experiences, previous learning experiences, and a myriad of

other variables had an impact on factors that motivated them to attend and how they

experience SI. Although the SI sessions were conducted by different leaders, learners

agreed on the majority of the reasons they felt motivated to attend the SI sessions. Infrequently, a learner had a different perspective of a situation, but, for the most part, students were consistent in their descriptions of motivating factors for attending SI and learning activities in these sessions.

Eight Factors Influencing Learners' Motivation to Participate in SI Sessions

The structural description or the essence of the lived experiences in terms of the motivating factors was both intrinsic and extrinsic in nature. The intrinsic motivation focused on how the learner felt after they attended the session. Learners used words "confident," "happy," "satisfied," "motivated," "addicted," and "excited" to emotions after attending these sessions. The extrinsic motivation was grade in course or previous performance experiences in mathematics. Learners said they needed to go to the sessions because they knew that math was their hardest course or they failed the class once already or they thought it would help them obtain a good course grade. When comparing the themes about motivation to attend SI and the previous literature, theories attributed to Gardner, Tatum, Goleman, and Tinto did appear to play a role in the SI process. Every learner and leader came to SI sessions with diverse maturity, cultural and educational backgrounds, and learning experiences.

Positively Influenced Other Parts of the Learners' Lives

This was not the initial reason that learners went to the session; rather, it was an added benefit. A major reason for continuing to participate in the sessions was seeing benefits more globally than just in math class. In the words of Garth, participation makes me feel as if they "could do anything." Astin (1987) suggested that peer learning is

valuable because it gives learners skills in effective leadership and teamwork. He believed that it is necessary to get the learners involved in the learning process. Tatum (2000) supported Astin with her theory in reference to minority populations.

Tinto (1987) supported this evidence when he stated adjustment to college is a problem for learners. He noted that students are not ready for college and do not know how to become students because they have not yet learned the study and listening skills that allow for comprehending and learning subject matter. Leaders in this study all supported Tinto's claim. They shared that part of their focus was just to teach them to figure out their own learning styles and "what works for them." Claudia added, "My main goal is for them to be independent learners and thinkers."

Gave Learners Confidence in Ability to Do Mathematics

When learners began the class, most of them did not know each other nor did they really know how they learned best. Both Tinto and Tatum addressed this motivating factor in their theories: Tinto with his description of *isolation*, and Tatum with her final point on climate of achievement. These theorists interfaced nicely because Tinto recognized the problem; Tatum suggested the solution. Tatum stated that in order for a climate of achievement to be created, students need to go through the process of learning for them, then build a community, which, in turn, establishes a climate in which all learners experience successful interactions. Learners created a comfortable learning environment which made them excited about learning mathematics. As Judy put it, "I'm addicted to it."

Provided the Learner with the Extra Practice and Study Techniques

Tinto stated that students do not know where to get the help to make them successful because they feel *isolated* and have not adjusted to the college. SI alleviated that problem because the support for the course was provided the first day of class. The learners saw the leader's presentation about the program and types of benefits they could gain from attending these sessions. The fact that the leaders attended class with learners added to program success. This theme also substantiated SI as a support mechanism for mitigating the incongruence factor described by Tinto. In this study, the sessions provided learners with extra practice and study techniques that helped them assimilate and understand the course content. The program helped learners demonstrate academic success and overcome differences in maturity level, cultural and educational backgrounds, and life and learning experiences in a supportive climate of achievement as described by Tatum.

Gave the Learners a Comfortable Interactive Atmosphere

This motivational factor was supported by Tinto's isolation component. SI combated social isolation by helping learners make connections to one another. As noted in previous research (Gardner, 1983) and Goleman (1995), it was clear from learners' narrations that they needed an environment, which recognized the importance of the emotional intelligences—interpersonal and intrapersonal. All students who attended the sessions did so because of a common goal: to achieve success. The effective interaction between other learners was also important because, when students collaborate they join a community of knowledgeable peers, exploring new ideas and participating in group consensus (Whitman, 1988). "A group of people engaging in intellectual interaction for

the purpose of learning" is a learning community (Cross, 1998, p. 4). With all the research being conducted on learning communities, it is interesting to see that the SI model has been employing learning community strategies for over thirty years. SI supports Goleman's theory that suggests that students need to interact with their peers to create a climate for achievement.

Interaction between the learner and leader as Whitman (1988) stated was believed to benefit learners because of leader's closeness as a peer and the individual interaction that occurs when peer teaching was conducted. Tinto (1987) discussed "shared knowing," which explains students getting to know one another quickly and intimately and help them get involved in school, both socially and intellectually. This process promoted cognitive development as well as an appreciation of a learner's ability to enhance his or her learning.

Associated with Course Learners Perceived as Difficult

Difficulty is listed as one of Tinto's factors influencing student retention. Research about SI stated that students will only attend course if they perceive it as difficult. The learners in this study stated that math was their most difficult subject; therefore, it qualified as a "high-risk course," according to Martin, Blanc, and Arendale's 1996 definition. Because students perceived these courses as difficult, they began classes looking for help. Again, they knew where to go: the SI session. One student mentioned that it was different from tutoring: "[Students] are in class with you and you see that others have the same questions, so you don't feel stupid."

Was Seen as a Means to Make a Good or a Respectable Grade in the Course

Motivation to succeed was important. When examining institutional data about the level of mathematics with which learners began the course (e.g., placement test (CPT) scores, multiple intelligences, previous college experience, and number of attempts taking the course), SI sessions attracted all types of profiles. As previously stated and supported by Gardner's MI theory, the pool of learners was diverse. It was not just the "high-risk" student who was attracted to the session, but also the students who wanted an A.

Because the leader was in the course, "good" students were attracted to the session because there was a peer leader who explained difficult mathematical concepts. Learners interpreted "a respectable grade" differently. For example, Jasmine wanted to earn the highest grade in the class and Denise was thrilled that she passed.

Enabled Second and Third Attempt Learners to See that They Needed more Help and Increased Their Desire to Pass

Students mentioned on the first day, the leader said "... students who participate in SI have higher chances of passing the class and the competency exam than those who did not attend," and for this reason, they took advantage of the program. However, at the end of the study, three learners who attended the sessions regularly were unsuccessful. Two out of the three stated that they knew what to improve when they planned to reenroll in the course.

Learned Strategies to Help with Test Anxiety or Math Anxiety Issues

Of the 10 learners chosen during the first week of SI session, all attended at least fifteen sessions according to the institutional data. Every student mentioned either how

attending the sessions met or exceeded their expectations. Learners used similar words

when discussing their experiences in the SI sessions and when they recounted "good

learning experiences." They discussed how the sessions made them feel good and their

belief that the sessions were helping them to achieve better grades in the course. Some

believed that they would never have passed without the assistance and strategies provided

in the sessions.

However, two learners stopped attending the session just after the state mandated

competency exam for the course. These learners experienced failure; therefore, they

stopped attending SI sessions because they knew nothing could change their performance

on the exam. Words such as "frustrated," "failed," "give up" were used to explain their

reasons to stop attending.

Nine Learning Experiences Associated with SI Session Participation

The structural description or the essence of lived experience in terms of the

learning activities demonstrated in this study established "comfortable environment" and

a way for the learners to gather with one another and a more knowledgeable peer to

experience the proper usage of study skills and strategies that were necessary to achieve

student success. Learners believed that SI sessions were "good learning experiences."

Learners used words such as "comfortable," "good," "confident," "excited," "happy,"

and, "satisfied" to describe their feelings about the learning experiences that took place.

Understanding the activities that actually took place in SI sessions (e.g. asking

questions, actively participating in group study, learning different ways to study

mathematics, using guided step-by-step problem solving, doing repetitions of math

problems, focusing on specific weaknesses and learning styles, using tricks, mnemonic devices, and flash cards or note cards, competing, and working on test anxiety or math anxiety issues) is important to the research.

Nolting (1991) outlined these study strategies and a few others, as ways to help developmental mathematics students learn. By participating in these sessions, learners were exposed to ways of studying mathematics, thus supporting the suggestion that SI helps students engage in thinking behaviors, which facilitated connections between notes, textbooks, and problem-solving (Martin & Arendale, 1993). Some learners. e.g., Isabella, believed that these study strategies could be used in other courses. This belief that learning how to study math would help them in other ways led to the first factor that influenced learner participation in the initial and subsequent SI sessions.

This finding about acquiring study skills in SI is not new; in fact, Wolfe (1998) found that learners attend SI sessions primarily for course assistance, and that they regard the acquisition of independent study skills as a bonus benefit of attending. Wolfe's statement explains Mike's surprise during his final interview when realized he "learned how to use his book to study," and that he probably would use that technique in the future.

It is important to note that the sessions provided a place to learn how to study and a person to lead in that development. The nine themes, which emerged about learning activities experience in SI, supported Tatum's prior research on a climate of achievement. The learner, who attends the SI session, experiences first-hand appropriate ways to study and, in the words of these participants, "really learn" mathematics, as opposed to "just doing it and not retaining it". In turn, then, these learners were able to discover their

potential, build a community of diverse learners, and create a successful and interactive group of achievers.

Lessons Learned

Because the research question is based on learners' perceptions, the phenomenological analysis of transcribed learner interviews was an appropriate methodology for this study. The phenomenological analytic process by which findings were arrived at was a reflective activity. It was similar to that used in everyday life. None of the subjects asked what was meant by "motivation" or "learning experiences" or "study strategies." Each subject apparently already understood what was involved in each term. In other words, each learner described motivation, learning experiences, or study strategies had to comprehend the meanings of these terms.

The study sought to understand the learner's way of being in a situation as it was actually lived and experienced by the learner interacting within the SI environment. The essential structure of the motivation to attend SI sessions and learning experiences learners had in the SI sessions was allowed to show itself and speak for itself. It was not translated or defined by external criteria (Creswell, 1998). The research remained true to all human phenomena presented (Creswell, 1998).

Practice questions were posed to non-SI participants for the purpose of refining the interview protocols in order to obtain desired information. Asking questions that could be answered with a one-word response was not an option. By the third interview, the second with the learners, the interviewer had done a much better job of writing questions that could not be answered with single word replies.

Areas for Further Investigation

One consideration is that phenomenological research can never exhaust the investigated phenomenon. The results of such research are "the essence of certainty to be established with reservations" (Merleau-Ponty, 1962, p. 396). Therefore, more study concerning motivating factors to attend SI sessions and learning experiences within these sessions should be conducted in developmental mathematics courses. Perhaps the findings from this study could be used to develop a quantitative instrument to measure motivating factors to attend the sessions.

Other areas researched were suggested by learners and leaders in this study. All participants mentioned the time, place, and day of the session. Some students were unaware that their math classes had SI sessions associated with them. Some leaders mentioned that they did not even know for sure that they would be conducting their SI sessions until the first day of classes.

Another interest was who or what type of learner is attracted to the sessions. They suggested that the college needed to advertise the program to be sure it attracted the right people and tell them what times the sessions would be offered. Learners indicated that they liked optional attendance because negative students did not come to the sessions to ruin the experience. However, the learner and leaders alike felt more students would have attended the session if they hadn't already scheduled other classes, work, or other commitments that kept them from active involvement.

Both learners and leaders felt that if faculty, advisors, and students realized the program's existence, more courses would be associated with SI. Several learners said this was the first time they had heard anything about this kind of support in college. Learners also stated that advisors and online information never told students about the program when they registered. They were surprised and delighted to have chosen one of the few courses supported by SI. Also, a comparison of motivating factors to attend tutoring and the types of activities learners engage in might be insightful. Several students shared that SI sessions were more helpful than the traditionally accepted form of help, tutoring.

Another area to be explored might be what characteristics make a good SI leader. During the interview process, learners stated that their interaction with the group and the leader was an important part of creating a comfortable learning environment. As the learning communities movement sweeps the nation, Supplemental Instruction should be researched as a viable form of a learning community.

<u>Conclusion</u>

Mirroring the changing demographics of the nation, the community college student population continues to grow in size and in diversity. Almost half of all students who enter these institutions need at least one remedial course, which is often developmental mathematics. Developed in 1973, Supplemental Instruction (SI) has quickly gained recognition as an academic support program that is used to aid student performance, retention, and academic success. This dissertation used a phenomenological approach to identify factors that motivated students' attendance and

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subsequent learning experiences in SI sessions associated with developmental mathematics.

With an increasing number of states mandating remediation as the sole responsibility of community colleges, the potential benefits of Supplemental Instruction in this institutional setting cannot be overlooked. This research demonstrated that data can be gathered directly from individuals, analyzed, and thereafter communicated so that meanings for the learners were not distorted, reduced, or fragmented. Rather, the meanings are viewed holistically, as part of the individual's whole experience (Creswell, 1994). Quantitative data can provide information, but it cannot determine the reasons learners say for attending a SI session nor can it tell how it felt to attend SI learning experience associated with developmental mathematics course curriculum in a community college setting. Therefore, a deeper understanding of learners' realities will improve abilities as community college educators to design and train SI leaders to provide rich, meaningful learning experiences for developmental mathematics students. Additionally, these realities will help motivate learners to attend these sessions.

Sources of data included five rounds of interviews (three with SI learners and two with SI leaders), a Multiple Intelligence Inventory, and statistical information from the referent community college. Study findings revealed eight themes that characterized motivating factors for attending these optional instructional sessions. Moreover, nine themes emerged from the data regarding types of activities learners experienced in SI. Findings suggest that SI helps create a climate of achievement for learners taking developmental mathematics in a community college setting.

Perception drove the reality of learners' experiences in these courses. In fact, students' description of these motivating factors and learning experiences in SI sessions were similar. Themes that emerged had very little variation among the learners from two levels of developmental mathematics associated with six different leaders. This research offers invaluable insight into lived experiences of developmental mathematics learners and can aid the efforts to provide effective support to help these learners achieve their educational goals.

APPENDIX A

INITIAL STUDENT INTERVIEW PROTOCOL AND RATIONALE

Initial Student Interview Protocol

Please answer the following questions. You do not have to respond to any question you do not wish to answer. Are you aware that I am audio recording this interview? As per the informed consent form, you are aware that I will personally transcribe the recording to improve the accuracy of my analysis.

Probes	Questions	Desired Information
1. Have you had any prior experience with SI?	1. Have you enrolled in, withdrawn from, and/or completed any course with an SI session before now? If so, how many SI sessions did you attend? Why did you attend?	1. What kind of prior experience do the students have with the SI program?
2. Tell me about a positive, memorable learning experience. How did that experience make you feel?	2. Describe an interesting learning experience.	2. Students' perception of an interesting learning experience.
3. Can other people influence your learning negatively? How did that experience make you feel?	3. Describe your perception of a bad learning experience.	3. Students' perception of a bad learning experience.
4. Is there anything you need in order to learn? Have you experienced any of these characteristics in your SI sessions?	4. Are there any specific characteristics that enhance your learning?	4. Perception of learning enhancers. Experience in SI session.
5. Is there anything you feel takes away from your learning? Have you experienced any of these characteristics in your SI sessions?	5. Are there any specific characteristics that you feel detract from your learning?	5. Perception of learning detractors. Experience in SI session.
6. Why are you planning to go?	6. Why are you attending and/or planning to attend SI sessions?	6. Plans to attend. Reasons for attending.
7. What will make you keep going?	7. What factors will influence your continued attendance in the SI sessions?	7. Why will you to attend SI sessions?
8. What will make you stop going?	8. What factors will influence your continued attendance in the SI sessions?	8. Why wouldn't you attend the SI sessions?
9. How would you describe __(SI leader name)_____?	9. Do you think of the SI Leader as a peer or a teacher?	9. Perception of SI Leader friend or teacher.
10. Explain in detail a SI session from start to finish.	10. Describe a typical SI session.	10. Perception of a typical SI session.
11. Is there anything else you would like to mention?	11. Is there anything else about the SI program you would like to student wants to share.	11. Any additional info that the student wants to share.

Initial Student Interview Rationale

The first round of student interviews was completed in the second and third weeks of SI sessions. The purpose of the first student interviews were to gain a basic understanding of the learning experiences that students were participating in or planning to participate in and to record the students initial feelings about the SI sessions and SI session activities. To accomplish this, the interview protocol contained eleven general, open ended questions. Question one in the associated probes were intended to generate information about whether the student had prior experiences with SI sessions. Question two and the associated probes were written to investigate what the participant's perception of a good learning experience is and how a good learning experience makes them feel. Question three and the associated probes were written to investigate what the participant's perception of a bad learning experience is and how a bad learning experience makes them feel. Questions four and five and the associated probes were written to investigate what characteristics influence the students learning either positively or negatively and have the students experienced either during the SI sessions. Questions six and the associated probes were written to investigate why the student first attended his or her initial SI session. Questions seven and eight and the associated probes were written to investigate what factors would influence the student's attendance in the SI sessions. Question nine was written to examine the perceived role of the SI leader. Question ten was written to examine how the students perceive a typical SI session. The purpose of the final question was to have the student share any additional information that s/he felt unable to share during the interview. This question also helped me prepare

for the second round of interview questions. After the interview questioning was complete, I reviewed the questions, paraphrasing back the main points or special circumstances from the interview and asked for confirmation.

APPENDIX B

INITIAL SI LEADER INTERVIEW PROTOCOL AND RATIONALE

Initial SI Leader Interview Protocol

Please answer the following questions. You do not have to respond to any question you do not wish to answer. Are you aware that I am audio recording this interview? As per the informed consent form, you are aware that I will personally transcribe the recording to improve the accuracy of my analysis.

Probes	Questions	Desired Information
1. Have you had any prior experience with helping students learn. Did you have a formal interview for the position?	1. Describe yourself, your background, and your perceived path to becoming a SI leader in developmental mathematics at this community college.	1. Background information, how did the leaders learn about the job, what skills do they have that qualified for the job.
2. What types of activities do you do during the sessions?	2. What are specific teaching and learning strategies that you will seek to implement in the SI sessions for this developmental	2. Based upon SI training, what does the SI leader perceive as a good learning experience. How does the SI leader training help to provide these experiences.
3. Is there anything in the session that would make you feel challenged?	3. What are some potential challenges that you anticipate regarding teaching and learning in the SI sessions that you lead.	3. Is the leader aware of that would characteristics that may prevent students from learning? Is attendance an issue?
4. Is there anything you need to provide for the students in order to encourage success?	4. Describe the most important learning experiences you facilitated in SI sessions. Please explain.	4. Perception of learning enhancers. Experience in the SI session.
5. Is there anything you feel takes away from learning during the SI session?	5. Are there specific circumstances that you feel have negatively impacted students' learning experience in the SI session? Please explain.	5. Perception of learning detractors. Experience in SI session.
6. Explain in detail a SI session	6. Describe a typical SI session.	6. Is the SI leader's description of learning experiences the same as the student learners experiences?
7. Is there anything else you would like to mention?	7. Is there anything else about the SI program you would like to share with me?	7. Any additional information that is important to the leader.

Initial SI Leader Interview Rationale

The first round of the SI leader interviews was completed in the fourth and fifth week of SI sessions; after all of the first-round student interviews were completed. The purpose of the SL leader interview was two-fold. First, to examine the perceived path including coursework, interviewing, and training process to becoming a SI leader. Second, to examine the SI leader's perception about the typical learning experiences students engage in during the SI sessions. The first question and the associated probes were written to learn the leader's perceived path to becoming an SI leader. The second question and the associated purpose were to learn about the training practices employed at the community college. The third question and the associated probes were to determine term if there were any challenges the SI leader anticipated. The fourth question and the associated probes were to have the SI leader describe the most important learning experience he or she ever facilitated. The fifth question was to determine if the SI leader was aware of the pitfalls of learning. In the final question, the purpose was to have the SI leader share any additional information that the he or she felt they were unable to share during the interview. This question also used to help me prepare for the second round of interviews SI leader interviews. After the interview questioning was complete, I went through the questions again paraphrasing back the main points or special circumstances from the interview and asked for confirmation.

APPENDIX C

SECOND STUDENT INTERVIEW PROTOCOL AND RATIONALE

Second Student Interview Protocol

Please answer the following questions. You do not have to respond to any question you do not wish to answer. Are you aware that I am audio recording this interview? As per the informed consent form, you are aware that I will personally transcribe the recording to improve the accuracy of my analysis.

Probes	Questions	Desired Information
1. Describe the kinds of things you are doing in your SI sessions right now? Are you using what you are doing outside of the session?	1. What kind of study strategies are you learning? Explain the group experience in the SI How do you feel about the things you have been doing in the session?	1. What SI session learning experiences are helping the student prepare for this course and future learning experiences? How does participation in the session make the student feel?
2. Is attending the session doing what you thought it was going to do?	2. Why are you attending?	2. Is the attendance in the SI sessions helping the student in the course?
3. How was your learning enhanced? Is it the interaction with other group members? Is it the interaction with the SI leader? Is it the extra practice?	3. Are there specific characteristics of the SI session that you feel enhanced your learning?	3. What is the student's perception of how learning is enhanced? And what are the related characteristics? Why does the student feel the way he or she does?
4. Was there a session that you remember that you don't feel contributed to good learning experience? Any session that you thought was a waste of time?	4. Are there any specific characteristics of your SI session that you feel detract from your learning?	4. What is the student's perception of learning detractors? And what are the related characteristics? Why does that student feel the way he or she does?
5. Is there anything else you would like to mention?	5. Is there anything else about The SI program you would like to share with me?	5. Any additional information that the student wants to share.

Second Student Interview Rationale

The second round of student interviews was completed during the eighth and ninth weeks of SI sessions. The purpose of this interview was to gather more specific details about topics generated in the first round of student interviews. In the first interviews, students talked about building a relationship with the SI leader and the other SI learners more specifically the kinds of activities they already experienced in the session. The first question and the associated probes were asked to get specific details about how students were experiencing SI in terms of relationships and learning activities. In the first round of interviews, the students explained that the reason they were attending the SI session is because they were experiencing success. Either the student experienced success by test grades or quiz grades or just feeling comfortable and capable. The second question and the associated probes were written to investigate why the students continued to attend SI sessions or if they no longer were attending and what happen that stopped them from attending. The third and fourth interview questions and related probes asked the students about characteristics of their SI sessions that either enhanced or detracted from their learning. These questions were also asked on the first round interview protocol, but in a much broader sense. These questions are much more specific to the SI session and to the class for which the session is attached. Also because the first interviews were done so early in the SI session meetings, the answers from the first interviews were speculative. Therefore, the questions were asked again to give the students another opportunity to give responses based on more learning experiences in the courses. The final interview question and the associated probes were written to get the

student to share any additional information they were unable to share during the interview. This question also helped me prepare for the final round of interview questions. In addition to the question and probes listed on the interview protocol, I asked participant-specific follow-up questions based on specific comments made by the learners in their first interviews. After the interview questioning was complete, I went through the questions again paraphrasing back the main points or special circumstances from the interview and asked for confirmation.

APPENDIX D

FINAL STUDENT INTERVIEW PROTOCOL AND RATIONALE

Final Student Interview Protocol

Please answer the following questions. You do not have to respond to any question you do not wish to answer. Are you aware that I am audio recording this interview? As per the informed consent form, you are aware that I will personally transcribe the recording to improve the accuracy of my analysis.

Probes	Questions	Desired Information
1. Did you learn what you expected to learn? Did the SI sessions work for you? Did you make any changes in your study strategies outside the SI session or for other course you are taking? What helped your learning best? What did you do well? What is you final course grade?	1. What kinds of study strategies did you do in your SI session? Do you believe that attending the SI session influenced your in class performance? Will you use any of these study strategies in the future?	1. More specifics on how the students completed the course. Did the SI session meet the student's expectations? What worked and what didn't work? Did the student learn any study strategies that he or she could use in the future? Did the student change his or her behaviors based on the experience?
2. How would you describe the interaction with the leader? With the group? How did the leader make you feel? How did the group participant make you feel? How did the SI session make you feel?	2. Describe the SI sessions in in terms of the group and leader. How important was attending the SI session to you? How many times did you attend?	2. More specifics on the SI session group dynamics. More specifics on the feelings a student had about attending the SI session.
3. Did you feel supported by the SI leader. Where you comfortable asking questions? Do you prefer group sessions or individual sessions? Would you recommend SI supported classes to others? Why or why not? Would you seek out this program for future classes? What suggestions would you make for future SI sessions attendees? What suggestions would you make for future SI leaders?	3. How satisfied are you with this course specifically the SI session?	3. Student overall impressions and final opinions about the developmental mathematics experience in conjunction with the SI session.
4. Ask for clarification, additions, and deletions. Follow-up on specific statements made by the individual in the previous interview that have not already been addressed.	4. Paraphrase back comments on learning experiences either by group or individual, thoughts about learning experience enhancers and detractors, and thoughts and feelings about the SI program from the interview and ask for confirmation.	4. Verification of researcher interpretation.
5. What would be the best way to contact you in the future?	5. May I contact you in the future if I need clarification of some Information during my analysis?	5. Permission to contact again if necessary.

Final Student Interview Rationale

The final round of student interviews was completed after the student finished all work associated with the course. The purpose of this interview was to gather summative information from the students about they completed the course, how important was the SI program to successful completion of the course, and how satisfied students were with their SI session learning experiences. The first question investigated learning-related issues including what the student felt they learned by attending the SI sessions, whether the sessions met their expectations, and whether they could use learning techniques in future learning. Throughout the first two rounds of interviews, the students described their relationship with other students and the SI leader as an important part of the SI session. Question two was designed to further explore how students interacted with other participants and the SI leader. How important was attending the SI session and how much did they believe that their attendance and participation in these sessions influenced their learning. The third question and the associated probes were written to gather information on students' overall satisfaction with their learning experiences in these SI sessions. The fourth question was used to verify my interpretation of student response. And finally, the last question sought permission to contact the students again in the future if necessary.

APPENDIX E

FINAL SI LEADER INTERVIEW PROTOCOL AND RATIONALE

Final SI Leader Interview Protocol

Please answer the following questions. You do not have to respond to any question you do not wish to answer. Are you aware that I am audio recording this interview? As per the informed consent form, you are aware that I will personally transcribe the recording to improve the accuracy of my analysis.

Probes	Questions	Desired Information
1. Did the student learn what you expected them to learn? Did the SI sessions work for your students? What do you think helped them learn best? What do you think the students could have done better? What could you have done better?	1. What kinds of study strategies did you demonstrate in your SI session? Do you believe that the students' participation in the SI session influenced their performance in the course? What study skills do you believe the students will be able to use in future classes?	1. Determine whether the students and SI leader have similar general statements about what kind of study techniques were in use and how can learning be improved.
2. How would you describe your interaction with the student? With the group? How did you create a comfortable place to study? How did you create a group learning experience. Describe atmosphere you tried to create.	2. Describe the SI sessions in in terms of the group and leader dynamics. How important do you believe attending the SI session was to each participant?	2. Determine whether the student and the instructor have similar general statements on the SI session group dynamics. More specifics on the feelings the SI leader has about attending the SI session.
3. How did you support and encourage the participants to ask questions? Did you enjoy your experience as an SI leader? Would you be an SI leader again? What suggestions would you make for future SI leaders and attendees?	3. How satisfied are you with this course, specifically the SI session? Why or why not?	3. Compare how the SI leader and the students characterize the learning experiences in the class and in the SI sessions. What are their suggestions and recommendations for future SI session.
4. Ask for clarification, additions, and deletions. Follow-up on specific statements made by the individual in the previous interview that have not already been addressed.	4. Paraphrase back comments on learning experiences either by group or individual, thoughts about learning experience enhancers and detractors, and thoughts and feelings about the SI program from the interview and ask for confirmation.	4. Verification of the researchers' interpretation.
5. What would be the best way to contact you in the future?	5. May I contact you in the future if I need clarification of some information during my analysis?	5. Permission to contact again if necessary.

Final SI Leader Interview Rationale

The final leader interview was completed after the courses were completed, and all student interviews were done. This interview protocol closely resembles the final student interview protocol because I wanted to examine similarities and contrasts in SI leader descriptions and student descriptions easier to observe. As with the student interviews, this interview was designed to gather summative information from the SI leader about how the students completed the course, how important was the SI program to successful completion of the course, and how satisfied students were with their SI session learning experiences. The first question investigated learning-related issues including what the leader felt student learned by attending the SI sessions, whether the sessions met the leader's expectations, and whether the information the SI leader shared with the student could use learning techniques in future learning. Question two was designed to further explore how students interacted with other learners and the SI leader. How important was attending the SI session to the leader and how did they believe that the attendance in these session enhanced or detracted from their learning. The third question and the associated probes were written to gather information on the leaders overall satisfaction with facilitation these SI sessions. The responses were all from the SI leader's perspective. The fourth question was used to verify my interpretation of student response. And finally, the last question sought permission to contact the leaders again in the future if necessary.

APPENDIX F

SI LEADER INFORMED CONSENT FORM

January 1, 2005

Dear Community College SI Leader for Developmental Mathematics:

I am a doctoral student in the College of Education at the University of Central Florida, Orlando. Currently, I am completing my dissertation research and thesis through a qualitative research study. My faculty supervisor and doctoral advisor is Dr. Ruby Evans, Associate Professor, Higher Education and Policy Studies, and the Program Coordinator for the Community College Specialization area in the College of Education, University of Central Florida, Orlando, 32816-1250, who can be contacted at (407) 823-1129, E-mail: revans@mail.ucf.edu

For my dissertation research, I am interested in conducting research that pertains to students' motivation for attending Supplemental Instruction (SI) sessions in developmental mathematics, the perceived learning experiences of those students who participate in these SI sessions, and the experiences of SI leaders who conduct SI sessions for these students. Enclosed you will find a set of potential interview questions, which are focused on your role as SI leader for students who are enrolled in either MAT 0012C, Pre-Algebra, or MAT 0024C, Beginning Algebra, at a campus of the Florida Community College, at which you provide SI, and that I have identified for inclusion in this study. I would like to solicit your participation in a qualitative interview in which you describe your experiences and role as a SI leader for developmental mathematics courses. With your permission, I would like to audiotape the interview(s). Only I or my faculty supervisor, Dr. Evans, will have access to the tape(s), which I will personally transcribe, removing any identifiers during transcription. The tapes will be erased, following completion of my doctoral research. Additionally, I am asking that you complete the attached Multiple Intelligences inventory, which should take approximately 15-30 minutes. I would also like your permission to record other demographic data that may assist with the study. I anticipate that the research findings will enable faculty at this Florida Community College, and others in the Florida Community College System (FCCS) to explore data that will aid student learning, both yours and future students. Your participation is completely voluntary and the results will be used to support student learning, retention, and academic success, so that you and other community college students like you, may benefit by such changes and more effectively learn.

With the guided supervision of my major professor, I will personally summarize and analyze the data collected from your individual interview. I will remove any identifiers during retrieval of this information from your survey responses and your identity will be kept confidential. Additionally, in my final report, your identity will not be revealed. There are no anticipated risks or compensation benefits to you as a participant in this study. You are free to withdraw your consent to participate and may discontinue your participation during the study at any time. If you have any questions about this research project, please contact me at 321-689-3288, email Jphelps@valenciacc.edu, or my faculty mentor/supervisor, Dr. Evans. Questions or concerns about research participants' rights may be directed to the UCFIRB office, University of Central Florida Office of Research, Orlando Tech Center, 12443 Research Parkway, Suite 207, Orlando, FL 32826. The phone number is (407) 823-2901. Please sign and date this consent form in the appropriate spot to indicate your participation. A second copy is enclosed for your records. By signing this form, you give me permission to report your responses in the final dissertation thesis manuscript and/or research report and/or potential articles for publication that may report and disseminate the findings of this research. Thank you for your participation in this important research study involving supplemental instruction in developmental mathematics courses at the community college.
Sincerely,   Sincerely,

Julie M. Phelps, Doctoral Student   Ruby Evans, Ed. D., Doctoral Advisor
_____I have read the informed consent described above for the Supplemental Instruction (SI) study.
_____I voluntarily agree to participate in the SI study.
_____I am 18 years of age or older.
_____/_____
        Participant Signature   Date

APPENDIX G

SI PARTICIPANT INFORMED CONSENT FORM

SI Participant Informed Consent Form

January 1, 2005

Dear Community College Student:

I am a doctoral student in the College of Education at the University of Central Florida, Orlando. Currently, I am completing my dissertation research and thesis through a qualitative research study. My faculty supervisor and doctoral advisor is Dr. Ruby Evans, Associate Professor, Higher Education and Policy Studies, and the Program Coordinator for the Community College Specialization area in the College of Education, University of Central Florida, Orlando, 32816-1250, who can be contacted at (407) 823-1129, E-mail: revans@mail.ucf.edu

For my dissertation research, I am interested in conducting research that pertains to students' motivation for attending Supplemental Instruction (SI) sessions and the experiences of developmental mathematics community college students who participate in SI sessions. Enclosed you will find a set of initial interview questions, which are focused on students, as yourself, who are enrolled in either MAT 0012C, Pre-Algebra, or MAT 0024C, Beginning Algebra, at a campus at a Florida Community College in the Spring 2005 term. I would like to solicit your participation in a series of qualitative interviews in which you describe your motivation to attend and reflections on subsequent learning experiences in your SI sessions. With your permission, I would like to audiotape the interview(s). Only I or my faculty supervisor, Dr. Evans, will have access to the tape(s), which I will personally transcribe, removing any identifiers during transcription. The tapes will be erased, following completion of my doctoral research. Additionally, I am asking that you complete the attached Multiple Intelligences inventory, which should take approximately 15-30 minutes. I would also like your permission to record other demographic data that may assist with the study. I anticipate that the research findings will enable faculty at the community college that you are attending and other faculty to explore data that will aid student learning. Your participation is voluntary and the results of this research will be used to support student learning, retention, and academic success, so that you and other community college students like you, may benefit by such changes and more effectively learn.

I will personally summarize and analyze the data collected from your individual survey. I will remove any identifiers during retrieval of this information from your survey responses and your identity will be kept confidential. Additionally, in my final report, your identity will not be revealed. There are no anticipated risks or compensation benefits to you as a participant for taking this survey. You are free to withdraw your consent to participate and may discontinue your participation during the survey at any time. If you have any questions about this research project, please contact me at 321-689-3288, email Jphelps@valenciacc.edu, or my faculty mentor/supervisor, Dr. Evans. Questions or concerns about research participants' rights may be directed to the UCFIRB office, University of Central Florida Office of Research, Orlando Tech Center, 12443 Research Parkway, Suite 207, Orlando, FL 32826. The phone number is (407) 823-2901. Please sign and date this consent form in the appropriate spot to indicate your participation. A second copy is enclosed for your records. By signing this form, you give me permission to report your responses in the final dissertation thesis manuscript and/or research report and/or potential articles for publication that may report and disseminate the findings of this research. Thank you for your participation in this important research study involving the community college.
Sincerely,   Sincerely,

Julie M. Phelps, Doctoral Student   Ruby Evans, Ed. D., Doctoral Advisor
_____**I have read the informed consent described above for the Supplemental Instruction (SI) study.**
_____**I voluntarily agree to participate in the SI study.**
_____**I am 18 years of age or older.**
_____/_____
Participant Signature   Date

APPENDIX H

SUPPLEMENTAL INSTRUCTION LEADER TRAINING AGENDA

Supplemental Instruction Leader Training Agenda

Wednesday, January 5, 2005
&
Thursday, January 6, 2005.

Introductions

Distribute Training manuals
        Recommendation: SI leaders should <u>take notes on everything</u> in training.

What is SI?
        The main focus for <u>*ALL*</u> SI leaders is to:

HELP STUDENTS LEARN HOW TO LEARN THE COURSE CONTENT

Ice Breaker

Duties of SI leaders:

Attend class & lab	3 hours
2 SI sessions	2 hours
Meeting time	1 hour
Meeting with Instructor	30 minutes
Preparation	30 minutes
Total hours	7 hours per week

What is expected of you:
        Motivation
        Commitment
        Positive Attitude
        Availability
        Concern for students and learning
        Patience
        Non-defensiveness
        Non-critical of the system
        Open to adapting SL leadership style according to suggestions of SL supervisors
        Turning in paperwork & filling out timesheets on time

SI Relationships
        See Training Manual (SI Leader Manual from University of Missouri Kansas City)

Conducting SI sessions
        See Training Manual

Math SI Sessions
        See Training Manual

Study Skills
        See Training Manual

Forms
        Time Sheet
        Sign In Sheet

Meeting Time
Where's our box?

Example of a Good SL session

Example of a Bad SL session (time permitting)

Videotaping SL session

Meet & Greet with Instructors

Wrap Up

APPENDIX I

IRB PERMISSION FOR STUDY

University of Central Florida   Office of Research

January 20, 2005

Ms. Julie Phelps
University of Central Florida
Educational Research Technology & Leadership
College of Education
Orlando, FL 32816

Dear Ms. Phelps:

With reference to your protocol entitled, "A Phenomenological Study of Study Learning Experiences in Supplemental Instruction Sessions for Developmental Mathematics Courses at _____ Community College" I am enclosing for your records the approved, expedited document of the UCFIRB Form you had submitted to our office.

Please be advised that this approval is given for one year. Should there be any addendums or administrative changes to the already approved protocol, they must also be submitted to the Board. Changes should not be initiated until written IRB approval is received. Adverse events should be reported to the IRB as they occur. Further, should there be a need to extend this protocol, a renewal form must be submitted for approval at least one month prior to the anniversary date of the most recent approval and is the responsibility of the investigator (UCF).

Should you have any questions, please do not hesitate to call me at 407-823-2901.

Please accept our best wishes for the success of your endeavors.

Cordially,

Barbara Ward, CIM
IRB Coordinator

Copies: IRB File

APPENDIX J

MULTIPLE INTELLIGENCES INVENTORY

Multiple Intelligences Inventory

© 1999 Walter McKenzie
http://surfaquarium.com/MI/inventory.htm

Note: This is not a test - it is a snapshot in time of an individual's perceived MI preferences.

Part I

Complete each section by placing a "1" next to each statement you feel accurately describes you. If you do not identify with a statement, leave the space provided blank. Then total the column in each section.

Section 1
_____ I enjoy categorizing things by common traits
_____ Ecological issues are important to me
_____ Hiking and camping are enjoyable activities
_____ I enjoy working on a garden
_____ I believe preserving our National Parks is important
_____ Putting things in hierarchies makes sense to me
_____ Animals are important in my life
_____ My home has a recycling system in place
_____ I enjoy studying biology, botany and/or zoology
_____ I spend a great deal of time outdoors

_____ TOTAL for Section 1

Section 2

_____ I easily pick up on patterns
_____ I focus in on noise and sounds
_____ Moving to a beat is easy for me
_____ I've always been interested in playing an instrument
_____ The cadence of poetry intrigues me
_____ I remember things by putting them in a rhyme
_____ Concentration is difficult while listening to a radio or television
_____ I enjoy many kinds of music
_____ Musicals are more interesting than dramatic plays
_____ Remembering song lyrics is easy for me

_____ TOTAL for Section 2

Section 3

_____ I keep my things neat and orderly
_____ Step-by-step directions are a big help
_____ Solving problems comes easily to me
_____ I get easily frustrated with disorganized people
_____ I can complete calculations quickly in my head
_____ Puzzles requiring reasoning are fun
_____ I can't begin an assignment until all my questions are answered
_____ Structure helps me be successful
_____ I find working on a computer spreadsheet or database rewarding
_____ Things have to make sense to me or I am dissatisfied

_____ TOTAL for Section 3

Section 4

_____ It is important to see my role in the "big picture" of things
_____ I enjoy discussing questions about life
_____ Religion is important to me
_____ I enjoy viewing art masterpieces
_____ Relaxation and meditation exercises are rewarding
_____ I like visiting breathtaking sites in nature
_____ I enjoy reading ancient and modern philosophers
_____ Learning new things is easier when I understand their value
_____ I wonder if there are other forms of intelligent life in the universe
_____ Studying history and ancient culture helps give me perspective

_____ TOTAL for Section 4

Section 5

_____ I learn best interacting with others
_____ The more the merrier
_____ Study groups are very productive for me
_____ I enjoy chat rooms
_____ Participating in politics is important
_____ Television and radio talk shows are enjoyable
_____ I am a "team player"
_____ I dislike working alone
_____ Clubs and extracurricular activities are fun
_____ I pay attention to social issues and causes

_____ TOTAL for Section 5

Section 6

_____ I enjoy making things with my hands
_____ Sitting still for long periods of time is difficult for me
_____ I enjoy outdoor games and sports
_____ I value non-verbal communication such as sign language
_____ A fit body is important for a fit mind
_____ Arts and crafts are enjoyable pastimes
_____ Expression through dance is beautiful
_____ I like working with tools
_____ I live an active lifestyle
_____ I learn by doing

_____ TOTAL for Section 6

Section 7

_____ I enjoy reading all kinds of materials
_____ Taking notes helps me remember and understand
_____ I faithfully contact friends through letters and/or e-mail
_____ It is easy for me to explain my ideas to others
_____ I keep a journal
_____ Word puzzles like crosswords and jumbles are fun
_____ I write for pleasure
_____ I enjoy playing with words like puns, anagrams and spoonerisms
_____ Foreign languages interest me
_____ Debates and public speaking are activities I like to participate in

_____ TOTAL for Section 7

Section 8

_____ I am keenly aware of my moral beliefs
_____ I learn best when I have an emotional attachment to the subject
_____ Fairness is important to me
_____ My attitude effects how I learn
_____ Social justice issues concern me
_____ Working alone can be just as productive as working in a group
_____ I need to know why I should do something before I agree to do it
_____ When I believe in something I will give 100percent effort to it
_____ I like to be involved in causes that help others
_____ I am willing to protest or sign a petition to right a wrong

_____ TOTAL for Section 8

Section 9

_____ I can imagine ideas in my mind
_____ Rearranging a room is fun for me
_____ I enjoy creating art using varied media
_____ I remember well using graphic organizers
_____ Performance art can be very gratifying
_____ Spreadsheets are great for making charts, graphs and tables
_____ Three dimensional puzzles bring me much enjoyment
_____ Music videos are very stimulating
_____ I can recall things in mental pictures
_____ I am good at reading maps and blueprints

_____ TOTAL for Section 9

Part II
Now carry forward your total from each section and multiply by 10 below:

Section	Total Forward	Multiply	Score
1		X10	
2		X10	
3		X10	
4		X10	
5		X10	
6		X10	
7		X10	
8		X10	
9		X10	

Part III
Now plot your scores on the bar graph provided:

100									
90									
80									
70									
60									
50									
40									
30									
20									
10									
0	Sec 1	Sec 2	Sec 3	Sec 4	Sec 5	Sec 6	Sec 7	Sec 8	Sec 9

Part IV
Key:

Section 1 – This reflects your Naturalist strength
Section 2 – This suggests your Musical strength
Section 3 – This indicates your Logical strength
Section 4 – This illustrates your Existential strength
Section 5 – This shows your Interpersonal strength
Section 6 – This tells your Kinesthetic strength
Section 7 – This indicates your Verbal strength
Section 8 – This reflects your Intrapersonal strength
Section 9 – This suggests your Visual strength

Remember:
- Everyone has all the intelligences!
- You can strengthen an intelligence!
- This inventory is meant as a snapshot in time – it can change!
- M.I. is meant to empower, not label people!

LIST OF REFERENCES

Arendale, D. (1998). Increasing the efficiency and effectiveness of learning for first year

college students through Supplemental instruction. In P. L. Dwinell, & J. L.

Higbee (Eds.), *The role of developmental education in preparing successful*

colleges students (pp. 185-197). Columbia, SC: The National Association for

Developmental Education and the National Center for the Study of the Freshman

Year Experience and Students in Transition. Available:

http://www.umkc.edu/cad/si/sidocs/daeffe98.htm. Retrieved October 16, 2004.

Ashwin, P. (2003). Peer support: Relations between the context, process and outcomes

for students who are supported. *Instructional Science, 31*, 159-173.

Astin, A. W. (1987). *Achieving Educational Excellence.* San Francisco: Jossey-Bass.

Blanc, R. A., DeBuhr, L. E., & Martin, D. C. (1983). Breaking the attrition cycle: The

effects of supplemental instruction on undergraduate performance and attrition.

Journal of Higher Education, 54(1), 80 - 89.

Boylan, H. R. (1999). Exploring alternatives to remediation. *Journal of Developmental*

Education, 22(3), 2 - 8.

Brookfield, S. D. (2002). Using the lenses of critically reflective teaching in the

community college classroom. *New Directions for Community Colleges, 118,* 31-

38.

Burmeister, S. (1996). Supplemental instruction: An interview with Deanna Martin.

Journal of Developmental Education, 20(1), 22 - 26.

Cohen, A. M., & Brawer, F.B. (2003). *The American community college.* San Francisco: Jossey-Bass.

Commander, N. E., & Stratton, C. B. (1996). A learning assistance model for expanding academic support. *Journal of Developmental Education, 20*(2), 8 - 14.

Congos, D. H., & Schoeps, N. (1993). Does supplemental instruction really work and what is it anyway? *Studies in Higher Education, 18*(2), 165 - 176.

Creswell, J. W. (1998). *Qualitative inquiry and research design: Choosing among five traditions*. Thousand Oaks, CA: Sage Publications.

Creswell, J. W. (1994). *Research design: Qualitative & quantitative approaches*. Thousand Oaks, CA: Sage Publications.

Cross, K. P. (1998). Why learning communities? Why now? *About Campus*, July-August, 4 - 11.

Doty, C. S. (2003). *Supplemental Instruction National Data Summary, 1998 - 2003*. Kansas City: University of Missouri.

Driscoll, M. P. (2000). *Psychology of learning for instruction* (2nd ed.). Boston: Allyn & Bacon.

Gardner, H. (1983). *Frames of Mind: The theory of multiple intelligences.* New York: Basic Books.

Goleman, D. (1995). *Emotional intelligence: Why it can matter more than IQ*. New York: Bantam Books.

Harbour, C. P., Middleton, V., Lewis, C., & Anderson, S. K. (2003). Naming the other: How dominant culture privilege and assimilation affect selected underrepresented populations at the community college. *Community College Review, 27,* 829-42.

Hodges, R. (2001). Encouraging high-risk student participation in tutoring and

    supplemental instruction. *Journal of Developmental Education, 24*(3), 2 - 9.

Hodges, R. B. (1997). The effect of self-monitoring strategies and verbal prompts on-

    high-risk students' attendance in tutoring and Supplemental Instruction and their

    academic achievement. *Dissertation Abstracts International, 59*(02), 0429A.

Jarvi, S. W. (1998). A quantitative and qualitative examination of Supplemental

    Instruction and its relationship to student performance (collaborative learning,

    academic support). *Dissertation Abstracts International, 59*(05), 1484A.

Kenney, P. A. (1998). Effects of Supplemental Instruction (SI) on student performance

    in a college-level mathematics course. *Dissertation Abstracts International,*

    50(02), 378A.

Kotze, G. S. (1994). Essentials of a program for Supplemental Instruction as academic

    support for technikon students in mathematics courses at entry-level.

    Unpublished doctoral dissertation, Faculty of Education (Department of

    Diadactics) at the University of the Orange Free State, Bloemfontein, Republic of

    South Africa. Available: Center for Supplemental Instruction, University of

    Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110

    USA.

Levin, J. S. (2000). The revised institution: The community college mission at the end of

    the twentieth century. *Community College Review, 28*(2), 1-25.

Mackenzie, W. (1999). Multiple Intelligences Inventory. Retrieved from

    http://surfaquarium.com/MI/inventory.htm October 11, 2004.

Marion, F. (1997). Phenomenography: A research approach to investigating different

    understandings of reality. In R. R. Sherman & R. B. Webb (Eds.), *Qualitative*

    research in education: Focus and methods (pp. 141-162). Philadelphia, PA: The

    Falmer Press.

Martin, D. C., & Arendale, D. (1993). Foundation and theoretical framework for SI. In

    D. C. Martin & D. Arendale (Eds.), *Supplemental Instruction: Improving first-*

    year student success in high-risk courses (2nd ed., pp. 41-50). Columbia, SC:

    National Resource Center for The Freshman Year Experience and Students in

    Transition. (ERIC Document Reproduction Service, No. ED 354 839).

Martin, D. C., Blanc, R. A., & Arendale, D. R. (1996). Supplemental instruction:

    supporting the classroom experience. In J. N. Hankin (Ed.), *The community*

    college: opportunity and access for America's first-year students. Columbia, SC:

    The National Resource Center for the Freshman Year Experience and Students in

    Transition. (ERIC Document Reproduction Service No. ED 393 486).

Maxwell, W. E. (1998). Supplemental instruction, learning communities, and students

    studying together. *Community College Review, 26*(2), 1 - 19.

McCarthy, A,. & Smuts, B. (1997). Assessing the effectiveness of supplemental

    instruction: A critique and a case study. *Studies in Higher Education, 22*(2), 221-

    232.

Merleau-Ponty, M. *Phenomenology of perception.* New York: Humanities Press, 1962.

Merriam, S. B. (2002). *Qualitative research in practice.* San Francisco, CA: Jossey-

    Bass.

Miles, M. B., & Huberman, A. M. (1994). *An expanded Sourcebook: Qualitative data analysis* (2nd Ed.). Thousand Oaks: Sage Publications.

Nolting, P. D., (1991). *Winning at math: Your guide to learning mathematics through successful study skills* (2nd Ed.). Pompano Beach, FL: Academic Success Press, Inc.

O'Banion, T. (1997). *A learning college for the 21st century*. Phoenix, AZ: The Onyx Press.

Perez, L. X. (1998). Sorting, supporting, connecting, and transforming: Intervention strategies for students at risk. *Community College Review, 26*(1), 63-78.

Ramirez, G. M. (1997). Supplemental instruction: The long-term impact. *Journal of Developmental Education, 21*(1), 2 - 9.

Rossman, G. B., & Rallis, S. F. (2003). *Learning in the field: An introduction to qualitative research* (2nd Ed.). Thousand Oaks: Sage Publications.

Roueche, J. E., & Roueche, S. D. (1999). *High stakes, high performance: Making remedial education work.* Washington, DC: Community College Press.

Saxon, D. P., & Boylan, H. R. (1999). *Characteristics of community college remedial students.* Mission Viejo, CA: League for Innovation in the Community College, The College Board.

Simpson, M. L., Hynd, C. R., Nist, S. L., & Burrell, K. I. (1997). College assistance programs and practices. *Educational Psychology Review, 9*(1), 39-87.

Stephens, J. E. (1995). A study of the effectiveness of Supplemental Instruction on developmental math students in higher education. *Dissertation Abstracts International,* 56(05), 1697A.

Tatum, B. D. (2000). The ABC approach to creating climates of engagement on diverse

    campuses. *Liberal Education, 86 (4)*, 22-29.

Tinto, V. (1987). *Leaving college: Rethinking the causes and cures of student attrition.*

    Chicago: University of Chicago Press.

Vygotsky, L.S. (1978). *Mind in society.* Cambridge, MA: Harvard University Press.

Whitman, N. A. (1988). *Peer teaching: To teach is to learn twice.* ASHE-ERIC Higher

    Education Report No. 4. Washington, D.C.: Association for the Study of Higher

    Education.

Wolfe, R. F. (1998). A model retention program for the community college. *Maryland*

    Association for Higher Education Journal, 11, 18 - 20.

Wright, G. L., Wright, R. R., & Lamb, C. E. (2002). Developmental mathematics

    education and Supplemental Instruction: Pondering the potential. *Journal of*

    Developmental Education, 26(1), 30-35.