Factors that Contribute to the Failure of Developmental Mathematics Courses

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Paper presented at Regional NCTM Conference Cleveland, OH, October 08

Abstract

This qualitative case study considers factors such as difficulty of understanding mathematics and poor mathematics practicing strategy under academic factors and lack of family support under social factors as those that contribute to the failure.

Many students entering community college have deficiencies in mathematics background and are required to take developmental courses. Despite students' regular attendance and interest in taking developmental mathematics courses, many of them fail these courses. The purpose of this study was to understand and identify major academic and social factors that contribute to the failure of developmental mathematics students. It was done from the perspective of those students who attend class regularly and repeat the same developmental mathematics course several times.

Introduction

As an open admission institution, a community college provides any high school graduate with access to postsecondary education regardless of past academic background. As a result, community colleges have become ideal places to help students with varying academic, ethnic, and economic backgrounds to enhance their chances to receive and benefit from higher education.

It is widely recognized that many students entering community colleges and universities have deficiencies in their mathematics background. A strong mathematical background has been viewed as a necessity for successful completion of post-secondary level mathematics courses. A common approach to dealing with this problem is to assess all students' mathematics skills at entry with a placement test. Based on placement test results, under- prepared students are required to take an appropriate remedial mathematics course (or series of courses) before they start taking college level credit mathematics courses.

Placing students based on standardized placement test results alone and telling the student to take the assigned courses is not working significantly. According to the study by Sven (2006), in the New York community college system, 60 – 70% of freshmen test into developmental mathematics and 40 – 60% fail on their first attempt. In the authors experiences as developmental mathematics faculties at Baltimore City Community College (BCCC), 60 – 80 % of students fail on their first attempt. Of these failing students, 20 - 25% of them have a good attendance record. BCCC allows students to repeat the same course up to three times. Students will be dropped from college if they do not pass the course in three attempts.

These problems associated with students completing developmental mathematics courses impact community colleges' graduation rates, retention rates, and, consequently, the nation's economy. Sven's (2006) research shows that the nation loses approximately $1 to 2 billion taxpayer's money per a year that is spent for developmental courses. These courses are remedial courses, supposed to be taught in high school curriculum, and usually result in no college credit.

Trautman (2006) reported that the four main reasons students in Texas decided to dropout from school are getting low or failing grades, failing exit tests, failing to meet graduation requirements, or having low attendance. Developing an effective program targeting developmental mathematics failing students with good attendance records increases community colleges' success and retention rate. According to Council (2006), "…accountability for the use of resources and student success has also become an issue" (p.8). Nowadays, colleges get state funds based on the rate of graduation, retention rate, and utilization of resources. Colleges with higher graduation rates, better retention rates, and resource utilization receive more state funds than colleges with lower graduation rates and lower retention rates and resource utilization. Despite students' regular attendance and interest in taking developmental mathematics courses, many of them fail their assigned courses. Sometimes they fail the same course twice. Studies suggest that there are academic and social integrating factors that contribute to the student failure, eventually leading the student to drop out from college.

Tinto (1975) claims that students' academic and social integration into the formal and informal structures of the institution affect their decision to persist or drop out. According to Tinto, the more students become integrated into the academic and social systems of the institution, the more likely they will persist at the institution or vice versa. Academic and social integration in predicting persistence suggests that what happens to a student after he or she enrolls at an institution may be as important to ultimate persistence in postsecondary education as the influence of pre-college variables.

Some of the academic factors are lack of pre-requisite mathematics knowledge, not doing assigned homework regularly, lack of study strategies, lack of good mathematics tutoring services at the college, and not understanding the instruction. Some of social factors are lack of community or family support, low socio-economic status, and lack of peer support. This research study considers these as presupposition factors that contribute to the failure of students in their developmental mathematics courses.

The model in Figure 1 summarizes the important data that need to be obtained and analyzed regarding students' academic, social, economic, and family background, and students' academic and personal goals.

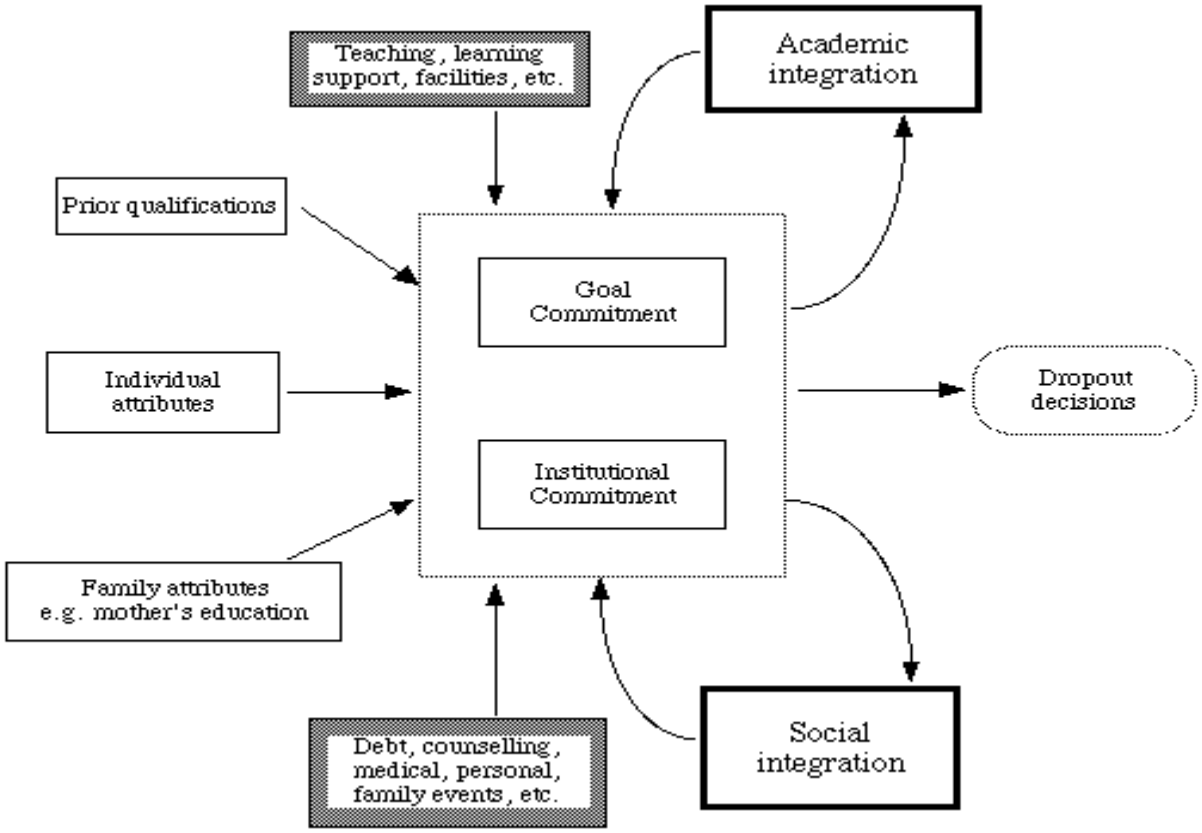

Figure 1: Tinto's model of student retention: Adopted from Draper S. (2005).

Purpose

The purpose of this study was to understand and identify major academic and social factors that contribute to the failure of developmental mathematics students. It was done from the perspective of those students who attend class regularly and repeat the same developmental mathematics courses.

Research question

The central research question is: What are the major academic and social integrating factors that lead to the failure of developmental mathematics courses for students who attend class regularly?

The research sub-question is: In what ways do course preparedness, prior mathematics experience, finance and employment, family and college support impacted student developmental mathematics failure?

Significance of the study

Most research points out poor attendance as main reason for failure in developmental mathematics, but this study focuses on those students who have failed developmental mathematics courses despite their regular attendance record. The finding of this study will help both the student and the community college. Colleges may develop a program by identifying needs of developmental mathematics failing students and provide special support for their learning.

Definitions

Under-prepared students are those whose current basic skills (reading, writing, and mathematics) are deemed to be insufficient to allow them to complete college-level work.

Failure in developmental mathematics courses is generally defined as receiving less than 70% of overall average course grade.

Good or regular attendance is attending a class over 95% in a semester.

Method

An approach is a qualitative research case study that considers and studies students who have failed in developmental mathematics courses. The instruments used to collect the data are interview and observation. Data analysis conducted based on transcription of unstructured in-depth interviews and observations.

The participants of this study are developmental mathematics students who have previously taken developmental mathematics courses twice, failed both times, and are currently taking same course for the last time (third time). Participants had to attend the past two classes regularly, and they should have a good attendance record in the current class.

For this research study, one student was selected. This student had taken elementary algebra twice in the previous consecutive semesters. Currently she is taking the same course for the last time and has a good attendance record.

Participant was interviewed based on interview protocol questions (Appendix A). Interview was tape-recorded and transcribed (Appendix B). Participants' class activity with the instructor and peer group in the classroom and ways of instruction to be delivered in the classroom was observed (Appendix C).

Site

The authors have chosen Baltimore City Community College Department of Mathematics as research site. One of the authors was the instructor in the class which the interviewee was attending.

Data Analysis

Research Question: What are the major academic and social integrating factors that lead to the failure of developmental mathematics courses for students who attend class regularly?

Sub question: In what ways do course preparedness, prior math experience, family and college support impact students' failing in developmental mathematics courses?

The qualitative analysis was used to organize the data from the interview and observation. Data sets were analyzed and results were reported following Creswell's (1998) procedures:

1. Organization of data. The interview was recorded and transcribed to check for accuracy.
2. Categorization of data. The interview data were clustered into meaningful groups (coded).

3. Interpretation of the data. Statements that fell into like codes were examined for specific meanings in relationship to the purpose of the study.
4. Identification of patterns. The data and their interpretations were examined for themes and patterns that characterized the study and allowed the researcher to draw conclusions.

Overall, twenty one codes were created from the participant's responses and observation. A total of seven themes or categories emerged from the analysis of the transcripts and observation (Appendix D). They are the following: (1) Difficulty of understanding mathematics; (2) Weak prior mathematics experience; (3) Poor mathematics practicing strategy; (4) Lack of family support, (5) Persistence in taking mathematics despite failure; (6) Improvements; and (7) College support.

Findings

The following conclusions were drawn based on the data presented.

(1) Difficulty of understanding mathematics. (Codes: HRAE – Hard to Remember All the Equations, HRE – Hard to Remember Everything, NUM – Not really Understand Math, and GLB – Can get it [math] a Little Bit, NLHM – Not like High school Math, and LPG – Lowest Passing Grade Received).

Participant indicated that she has a problem of understanding mathematics. The main reasons emerged from her responses are: (1) not being able to memorize everything especially when it comes to equations, and (2) hard to remember everything during taking test or quiz, and (3) only getting the mathematics concept partially. For example, she stated:

> These are equations that I do not get most of time. It is hard to remember all of the equations…when I get a test or a quiz, it is hard to remember everything.
> I don't really understood math … I don't know I just can't explain it. (T., Int T, p.2)
> I can get it [understanding math] a little bit but it is like when I take quiz or test that is when I am lost. (T., Int T, p.3)
> But some of the stuff is hard for me to understand. (T., Int T, p.4)

Equation is the major topic that is discussed in elementary algebra almost in every chapter. If a student does not know how to solve equation, then he/she will definitely have a problem in understanding elementary algebra.

Participant was asked about her experience in mathematics courses that she had taken in high school and at BCCC. She explained that she was having a hard time grasping the concept in her high school mathematics as well as arithmetic courses at BCCC. She also obtained only a passing grade "C" in all high school and arithmetic mathematics courses. According to T.:

> The problem with math started in high school. The problem started with geometry and then continued to algebra. I took three courses, geometry, algebra and pre- algebra. I didn't like my high school math courses…I passed all the courses with "C". I was a "C" math student in high school. (T., Int T, p.2)
> In the observation, I have found the importance of course preparedness and prior math experience impacting students understanding of the lesson in the classroom. (Obs. P.11)

It was clear that participant was struggling in her high school mathematics courses even though she had taken pre-algebra, algebra, and geometry courses and passes all three with "C". Taking all pre-algebra, algebra, and geometry courses in high school did not even help her to skip arithmetic course at BCCC. Arithmetic course is the first developmental mathematics course which is equivalent to high school pre-algebra.

(2) *Poor mathematics practicing strategy.* (Codes: WMA – Work Math Alone, RE – Remembering everything, NAQ – Not Asking Questions in class, and NUTS – Not Use of Tutoring Service).

Participant's mathematics study or practicing skill puts her in disadvantage position. Working in group helps students to understand mathematics concept, but she prefer to do mathematics alone. She stated that her interest about working alone as:

> I like working by myself. I feel that group work do not really help a person understand it more because probably two people out of the group may do all the work. (T., Int T, p.4)
> Previously, I did not have a good relationship with students in my classroom…(T., Int T, p.3)

Understanding mathematics need not be necessarily remembering everything; instead it is about having a logical flow between steps and making connection with the necessary procedures or rules for a given problem. T. mentioned: “It is hard to remember all of the equations…when I get a test or a quiz, it is hard to remember every thing.” (T., Int T, p.2)

Student who asks questions in classroom benefits more in understanding the mathematics concept. Waiting until the end of the class to ask question is not a good strategy especially in mathematics classes. When solving mathematics problem, one has to understand the whole process or every steps on how to solve a given problem. If a student misses any steps in the process and does not ask the instructor immediately, then he/she will not be able to grasp the concept. For the question the authors asked the participant about her feelings to ask teacher or staff questions when she need to or want to, she replied: “Yes. But I normally ask after class.” (T., Int T, p.4)

The participant also mentioned that she does not want to go to the tutoring services. The purpose of having tutoring service is to help students especially those who are struggling in mathematics. Avoiding the tutoring service makes understanding of mathematics more difficult especially for those who are already failing in mathematics. Participant indicated: “I went to the tutoring center only two times since I start [Fall 2005] taking courses at BCCC…” (T., Int T, p.3)

(3) Lack of family support. (Codes: NP – No Parents, and LA – Live Alone)

Family support is very important for student’s good performance at school. However, the participant’s response for the question indicated that she was not getting parent’s assistance because: (1) she does not have parents, and (2) she lives alone. Her response is given below: “... I do not have parents. I live by myself.” (T., Int T, p.1)

(4) Persistence in taking mathematics despite failure.(Codes: GO – Goal Oriented, GA – Good Attendance, WWT – Willingness to Work with Teacher, and TDM – Trying to Do Math).

Even though participant failed elementary algebra twice, she was determined to take same course for the third time. Her perseverance comes as a result of: (1) her vision to be a nurse, (2) good class attendance, (3) recognizing the advantage of making use of teacher’s help and willingness to work with her teacher, and (4) trying to do mathematics without loosing hope. These data are emerged from her response and indicated below:

> …I knew I need to take some classes to get to the point where I want to be a nurse. …but I would try to do it [math] … I had a good attendance. My relationship with the teachers and students were good. (T., Int T, p.2)
>
> … I had a good attendance. (T., Int T, p.3)
>
> I feel though that the teachers are trying to help me in all my classes. I feel comfortable in that, the teachers really want the students to pass so I will do to work up with them. (T., Int T, p.4)

(5) Improvement. (Codes: ITG – Interest to work with classmates, and WT – Working with Teacher)

Participant mentioned that she was not making any progress on the previous two elementary algebra courses. However, despite failing one test, she indicated that she is making progress in the current class. She described her progress in two ways: (1) she developed interest working with classmates, and (2) she wanted working with her mathematics teacher. These data can be observed in participant’s interview response and class observation as follows:

> I took it [elementary algebra] the second time in Fall 2006. I did not see any progress. In the current class we had two tests and I got 70 and 60. I like the way the course is conducted. Previously, I did not have a good relationship with students in my classroom, but now I have developed some relationship. I work together with them in class. (T., Int T, p.3)
>
> Yes. I think I am doing well. (T., Int T, p.4)
>
> I feel comfortable in that, the teachers really want the students to pass so I will do to work up with them. (T., Int T, p.4)
>
> I have noticed friendly teacher-student relationship. Students were not afraid of asking questions to their instructor. Student – student relationship was also good. I have noticed students helping each other especially those who seat together. (Obs. P.12)

(6) College Support. (Codes: CT - Caring Teacher, AS – Academic Support, FAS – Financial Aid Support, and CS – Counseling Service).

Participant indicated that BCCC provided her with necessary facilities that she needed. She responded her comments as follows:

> I am comfortable at BCCC. I feel though that the teachers are trying to help me in all my classes… I feel comfortable in that, the teachers really want the students to pass… (T., Int T, p.4)
>
> I get all the necessary support such as financial aid, tutoring service, and counseling from BCCC. (T., Int T, p.5)

Discussion

The analysis of this case study, data collected from one participant using interview and observation, shows that major factors that contribute to the student's failure in elementary algebra course are: (1) difficulty of understanding mathematics; (2) poor mathematics practicing strategy; and (3) lack of family support.

Difficulty of understanding mathematics may arise as a result of weak prior mathematics knowledge and poor mathematics practicing strategy. Difficulty of understanding mathematics, weak prior mathematics knowledge and poor mathematics practicing strategy can be considered as some of major academic integrating factors that negatively affect student's performance in developmental mathematics courses. As a result, these factors partially answer the major question of the current research: What are the major academic and social integrating factors that lead to the failure of developmental mathematics courses for students who attend class regularly?

Lack of family support may be considered as one of the major social integrating factors that contributed to student's failure in developmental mathematics courses. Family plays a great role when it comes to children's school performance. Participant lacks emotional assistance that she supposed to get from her parents. Parent assists their children emotionally by encouraging them consistently.

Despite the above three negative academic and social integrating factors that contribute to the participant's failure in developmental mathematics courses, there are some noticeable progressive signs. These are the following: (1) persistence in taking mathematics despite failure; (2) regular class attendance; (3) improvement towards working with peer students as well as with the teacher; and (4) improving college support. These positive signs may help the participant to overcome her difficulty of understanding elementary algebra and develop positive attitude towards mathematics courses in general.

For further investigation, the researchers recommend the following: (1) studying the impact of class-preparedness and test taking skill; (2) expanding the current research for more participants in both genders; and (3) expanding the current research for all developmental mathematics courses.

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Appendix A
Interview Protocol

Research Question	**Interview Questions**
General Background	1. Can you tell me a little about yourself? 2. What is your educational and family background? 3. How do you like college? Being a developmental mathematics student?
What are the major factors that contribute to students' developmental math failure?	4. What do you think are the key factors that prohibited you from passing this math course?
In what ways that course preparedness affected student's math understanding?	5. Do you prepare for your math class ahead of time? • If yes, does it help? • If not, why?
In what ways that prior math experience affected student's math understanding?	6. What mathematics courses have you taken in high school? 7. How was your high school mathematics performance? 8. How was you're Arithmetic course performance at BCCC?
In what ways that finance and employment contribute to students' developmental math failure?	9. Are you working to support yourself financially? • If yes, what impact your employment has towards your math performance? • If not, what sources you have to support yourself financially?
In what ways that parents and school support impacted student's developmental math performance?	10. What support you getting from your parents? 11. What support you getting from BCCC?

Appendix B
Interview Transcript

BCCC
March 07

A: The purpose of this study is to explore what major factors contribute to student's developmental mathematics failure. I am going to ask you some questions. Please feel free to say whatever you want to say. If you do not understand the question or need any clarity just let me know. I will ask you a follow up question if I think it is necessary. Is it ok with you?
T: Yes
A: Do you mind me taping our interview?
T: No. I do not mind.
A: Thank you for agreeing to do this interview. Can you tell me a little about where are you from, your high school, educational background and family background?
T: I am from Baltimore Maryland. I am a graduate of Randallstown high school. I do not have parents. I live by myself.
A: How did you end up here at BCCC? And how did you end up taking developmental courses?
T: I ended up here as a full-time student because I knew I need to take some classes to get to the point where I want to be a nurse. It was Fall 2005. After I took ACCUPLACER placement test, *I was assigned to Math-80* (Arithmetic) and passed this course the first time. It was easy, just basic Math. I like the part that I do not get. These are *equations that I do not get most of the time*. *It is hard to remember all of the equations*. I guess I would think it is good, when I get a test or a quiz; *it is hard to remember every thing*. But I enjoyed the course.
A: what were your high school math classes like? Did you enjoy them? How many math courses did you take?
T: *I don't really understood math* but I would try to do it. I don't know I just can't explain it. *The problem with math started in high school*. The problem started with geometry and then continued to algebra. I took three courses, geometry, algebra and pre- algebra. *I didn't like my high school math courses*. I had a good attendance. My relationship with the teachers and students were good.
A: what kind of math student were you in high school?
T: I passed all the courses with "C". *I was a "C" math student in high school*.
A: How was your arithmetic (pre algebra) class going at BCCC? When did you take arithmetic class, did you enjoy it?
T: It was like I could understand it when I was in class and then I go home and I try to study. *I can get it a little bit but it is like when I take quiz or test that is when I am lost*. And that is because I knew some people that help me out at home. My cousin helps me sometimes and she is a high school graduate. *I went to the tutoring center only two times since I start taking courses at BCCC.* I could not really understand what they were saying so I did not go back. I need somebody to explain to me the easiest way possible. That is the reason why I do not want to go to the tutoring center.
A: When was the first time you took elementary algebra class at BCCC? How was your experience?
T: I took it in Spring 2006 for the first time. I had a good attendance. I took it the second time in Fall 2006. I did not see any progress. In the current class we had two tests and I got 70 and 60. I like the way the course is conducted .Previously, *I did not have a good relationship with students in my classroom*, but now I have developed some relationship. I work together with them in class.
A: Are you learning as much as you want? Do you feel you understand the material by your own standards? Are you getting good enough marks?
T: Yes. I think I am doing well.
A: Do you feel comfortable being a student at BCCC?
T: I am comfortable at BCCC. I feel though that the teachers are trying to help me in all my classes. But *some of the stuff is hard for me to understand* and which I am working on it. I feel comfortable in that, the teachers really want the students to pass so I will do to work up with them.
A: Do you think that getting to know students is useful to you? Why?

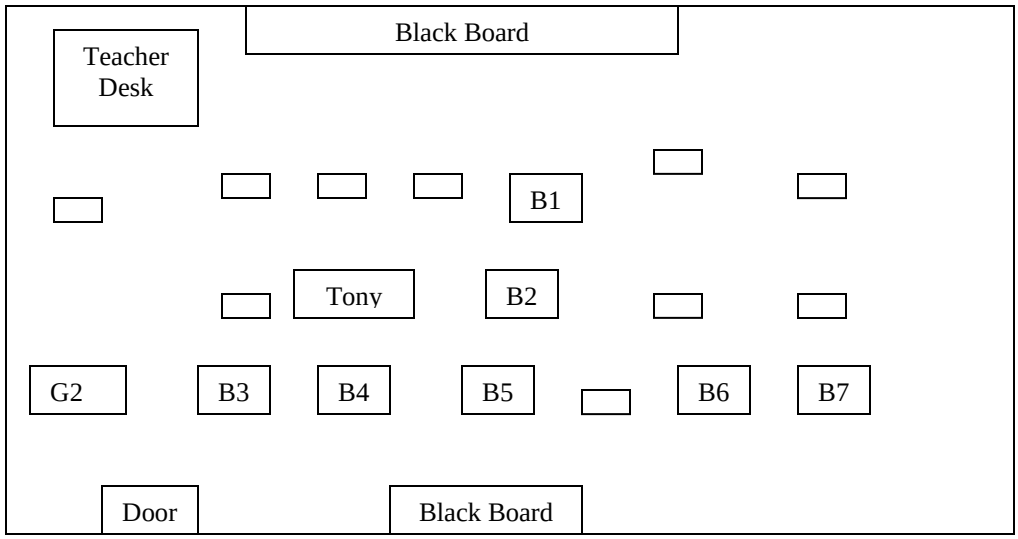
T: Sure! So I can have people to help me if they understand something and I can be able to help them if they need help.
A: Do you feel able to ask your teacher or staff questions when you need to or want to?
T: Yes. But I normally ask after class.
A: Do you have a problem collaborating in group work as required?
T: *I like working by myself. I feel that group work do not really help a person understand it more* because probably two people out of the group may do all the work. But if every body works by himself, then every body may work on the problem and get the answer.
A: What support you getting from BCCC?
T: I get all the necessary support such as financial aid, tutoring service, and counseling from BCCC.
A: Thank you for your time and cooperation.
T: You well come.
In this interview I have noticed that lack of prior mathematics knowledge is one of major problems that contribute towards students' developmental math failure. It is indicated in the transcript that participant was struggling in her high school mathematics courses even though she had taken pre-algebra, algebra and geometry courses and pass all three with "C". Taking all pre-algebra, algebra and geometry courses in high school did not even help her to skip arithmetic course at BCCC. Arithmetic course is the first developmental mathematics course which is equivalent to high school pre-algebra. She had also a problem with equation part of arithmetic. Equation is the major topic that is discussed in elementary algebra almost in every chapter.
The question "what were your high school math classes like? Did you enjoy them? How many math courses did you take?" is the most fruitful one because it gave insight to understand where the problem started. She mentioned:" *The problem with math started in high school*. The problem started with geometry and then continued to algebra".
I allowed room for surprise in the interview when I was asking my participant about group work. I thought she would say she likes working in a group as required, but her response was the contrary. She said: *I like working by myself. I feel that group work do not really help a person understand it more* because probably two people out of the group may do all the work. But if every body works by himself, then every body may work on the problem and get the answer.
I wish I had explored further about her course preparedness after and before each class for math courses. If I am going to address this issue in my next conversation, I will just ask her: Do you prepare for your math class ahead of time? If yes, does it help? If not, why?
Student - researcher was my relationship with my participant during the interview. But After I heard her stories that having no parents and working hard without giving up, encouraged me to help her out with elementary algebra course that she is taking now for the last time. I promised her to tutor her one hour every Friday.

Appendix C
Classroom Observation

Elementary Algebra
BCCC
March, 2007

Before the study, the researchers identified a student who was repeating the course. The student identified was taking elementary algebra course for the third time. The researchers asked the student willingness to participate in this study which focuses on understanding the major academic and social factors that contribute to students' mathematics failure. The student agreed to participate in the study. The student was female African American and was given name Tony. Elementary algebra course is one of the three non-credit developmental mathematics courses offered for students who pass either arithmetic algebra course or placed into elementary algebra course based on their ACCUPLACER placement test score.

The teacher knows that all of the students belong to this class have fulfilled the requirement for elementary algebra course.



I entered the class at 12: 05. The class runs from 12: 00 – 12:50 PM. Monday, Wednesday and Friday. The class room is small and accommodates about 20 seats. The seats were in semi-rows with a few of the seats out of line. I sat on far right corner of the third row (B6).

Mrs. N. is an experienced full time faculty who teaches elementary algebra course. She is teaching elementary algebra at BCCC for the second semester. She has taught the same course at Community College of Baltimore County (CCBC) for more than three years.

There were 8 students in the class. Two were African American women ranging in age between 18 and 20. One was seating on the second row near the center and the other was seating at the left corner of last row. The rest 6 were all African American men ranging in age from 18 to 22. One of the men was seating at the first row and the second man was seating at the second row near the center and the remaining four of the six men were seating at the last row.

The teacher was seating on her desk talking to the students about the review problems that she gave out previously. Then teacher started writing on the board "test on Monday from chapter 3 and 4". The teacher was reminding the students that they were going to review those chapters by doing some problems from review sheet.

Teacher: Today we will do as many problems as we can until time allows on randomly selected problems from the review sheet. (There were about 50 problems on the review sheet and she wanted to cover all topics on both chapters in 50 minutes class period).

Teacher: Let us start with the first problem. Then she wrote the question on the board.

Determine whether a line passing through (1, 5) and (4, 11) is parallel, perpendicular or neither to a line passing through (7, 17) and (28, 59).

Then she continued writing the following:

M1 = M2 for parallel lines. (The relationship of the slopes of two parallel lines).
M1. M2 = -1 for perpendicular lines. (The relationship of the slopes of two perpendicular lines)
Teacher: you need to remember to work on the slopes whenever the question is about parallel and perpendicular lines. In this case, we are not given slopes directly for each line but we know how to find the slopes of each line given two points on the line. (Teacher waited for the student to respond).
B1: Yeah, we use slope formula, m = (y2 – y1)/ (x2 – x1). Tony along with the rest of the students nodded their head agreeing with B1 suggestion.
Teacher: What are the slopes for both lines? (Teacher gave for the class about two minutes to calculate the slope).

B4: A slope for both lines is 2.
Majority of the class including Tony said yeah, that is right.
Teacher: Everybody got that? All the students responded they got it.
Teacher: Wrote on the board m1 = 2 and m2 =2. Then asked the class, what can we say about the two lines then? She reminded the class that the purpose of finding the slope of each line was to determine whether the two lines are parallel, perpendicular or neither.
Majority of the students including Tony answered the two lines are parallel.
Teacher: What is the reason that the two lines are not perpendicular?
G2: because 2 times 2 is 4 which is not equal to -1. B3 and B4 seating beside G2 agreed with G2 and said yeah.
Teacher: Remember to find out whether two lines are perpendicular; all you need to do is multiply the slopes of both line and see if the result is -1. If the product of the two slopes is not equal to -1, then the two lines are not perpendicular. Ok?
Class: Yeah.
All the students engaged in doing math and they were writing down what the teacher was explaining to them.
Teacher: next question # 119 and she write the question on the board.
3x – 6y = -15
18x + 9y = 6
Follow the same instruction as the above problem. We need to determine whether the two lines are parallel, perpendicular, or neither. How can we determine that? Teacher asked.
B1: Find the slope of each line from the equation and compare.
Teacher: Good. How can we find the slopes of each line?

B1: Rewrite first each equation in y = mx + b form and then pick the slope.
Teacher: Yes. Excellent! We need to first write each equation in slope intercept form (then teacher wrote y = mx + b on the board) and then pick the coefficient of x (by pointing at m using her index finger on y = mx +b on the board) as the slope of the line.
The teacher reminded students to isolate positive y by itself on one side before they consider coefficient of x as the slope of the line. She was indicating what she means using her index finger for both y and the slope. Teacher continued asking students to find the slope intercept form of each line. Then she continued isolating y by itself for both equations.
B5: I do not understand how you got y = (1/2) x + (15/6) on the first equation.
Teacher: As I told you several times, do math step by step. Remember to do one step at a time. First, subtract 3x on the left side to isolate -6y by itself. Then you subtract same 3x on the right side to balance both sides of the equality sign. Then we get -6y = -3x -15. Right? Instructor asked looking at B5. B5 nodded his head and said ok. After that, instructor continued explaining, we divide both sides by -6 to isolate positive y by itself. Then we get y = (1/2) x + (15/6).Right? Instructor asked by looking around the class.
Class: replied yeah.
Teacher: now, what are the slopes of each line? She wrote m1 next to first equation and m2 next to the second equation.
Tony and B5 replied together answering m1 is ½ and m2 is -2.
The instructor continued writing on the board the values of m1=1/2 and m2 = -2.

Teacher: What can we conclude about the two lines then? Looking around the class asked.
Tony: Oh. They are perpendicular.
Teacher: How many of you say Tony is right?
Majority of the class: yeah. She is right.
Teacher: Yes. Tony is right. Good job. Since the product of the slopes of the two lines is -1 (she wrote (1/2)(-2) = -1, then said "the two lines are perpendicular".
Teacher: next question is #129: Graph x + y = -1. How can we draw the graph of this equation of a line?
B1: make a table for three points that satisfy the equation.
Teacher: Yes. Good job. Let's make a table. Remember we choose any three points for x and then we find the corresponding y values for each x value. After she makes the table, ask students to choose for value of x. Based on students' response she comes up with the following table:

x	y
0	
2	
4	

Teacher: asked class to find out the corresponding value of y for each x.
G2: Filled out the table referring her notes as follows:

x	y
0	-1
2	-3
4	-5

Teacher: Good job. All you need to do is plug in each value of x in the equation (referring to x + y = -1) and solve for y. now what is next?
B3 and B4: Plot the points on the graph.
Teacher: Yes. Good job. Looking around the class she reminded students that the purpose of making the table was to draw the graph. Then she drew the graph on the board and continued writing the next problem.
Teacher: Graph: y = x + 4. In this problem, we are going to apply slope intercept form to graph the line. Then she continued asking class "what was the slope of the line?"
B1: slope is 1.
Teacher: Good. Now what is the rise and run of the slope? She asked the class.
Majority of the class answered that rise is 1 and run is 1.
B7: How do you get 1 for run?
Teacher: what is the formula for slope in terms of run and rise? She asked back B7.
B7: rise over run.
Teacher: Good. If slope = rise/run and slope is 1, then how can you write slope 1 as a fraction rise/run? She asked B7 again.
B7: Yeah. I got it now, we can write 1 as 1/1.

Teacher: remember that whole numbers can always be written as a fraction by putting 1 as a denominator.
Here I noticed that the teacher is helping the student by directing him using leading questions to understand the concept by himself. I found it as a very interesting approach.
Teacher: now we got rise and run for the slope. Next is to find the intercept.
Before teacher asks the question, class together said: "intercept is 4".
Teacher: Good! Now how do we graph the line?
B3: plot y intercept 4 as first point and then rise and run 1 unit starting at 4 to get the second point (1, 5). Then pass a line through the two points.
Teacher: Good job. That is it!. Then she drew the line on the x-y plane.

B7: Oh I can do graphing!
Teacher: Remember to study slope, parallel and perpendicular lines for your next test. I want you to work on the problems provided in the review sheet. If you work as many problems as you can at home, you will see getting good results. But if you depend only on class work, that will not be enough.
B7: I may want to change my work schedule. I do not want to fail this class.
Teacher: Do whatever you can in order to have more time to practice.
While the teacher and B7 were having dialog, it was almost time for end of the class. Most of the students were packing up their learning materials.
Class Dismissed at 12: 49 pm.
Observer left class room at 12: 52pm.

In this observation, I have found the importance of course preparedness and prior math experience impacting students understanding of the lesson in the classroom. For instance, the teacher was stressing the importance of course preparedness as “practice on review problems at home” and prior math experience as “write a whole number as a fraction”. Course preparedness and prior math knowledge are two of the four major factors that are going to be explored in this research study. The research question for this study is: In what ways do course preparedness, prior math experience, finance and employment, and family and college support contributes for students’ developmental mathematics failure?

One routine that I have noticed as a dominant in this classroom is the teacher. The teacher was the one who picks the questions randomly. I think it would have been a good idea if students were given opportunity to bring their own difficult questions from the review sheet to the class, and the teacher emphasized and worked on those problems in class together.

I have noticed friendly teacher-student relationships. Students were not afraid of asking questions to their instructor. Student – student relationship was also good. I have noticed students helping each other especially those who seat together.

The educational setting in this classroom was from simple to more difficult pattern. The instructor started with slopes of parallel, perpendicular, and then went to graph a line using three point method and slope intercept method.

The sources of knowledge in this classroom were text book, student’s note, and the teacher. I noticed students referring their text book and notes when the teacher was asking them question.

Helpful techniques of note taking that emerged during this observation are: 1) starting by jotting down some notes, and 2) setting aside an adequate amount of time to complete the notes. The conversation in the classroom is so fast, and it is very important to jot down important points to remember the actual process during recording. Setting aside enough time, especially when it is first time observation, is important to complete the notes. The conversation and events do not flow smoothly from mind to the paper within a short period of time. For instance, after I thought I have finished writing a section of my observation and when I reread the same section the second time, I realize that I have forgotten something. Then I added it.

Appendix D
List of Codes

I.	Difficulty of understanding math	
1. Hard to remember all the equations		HRAE
2. Hard to remember every thing		HRE
3. Not really understand math		NUM
4. Can get it a little bit		GLB
5. Not like high school math		NLHM
6. Lowest Passing Grade received		LPG
II.	Poor math practicing strategy	
1. Work Math Alone		WMA
2. Remembering Everything		RE
3. Not Asking Question in class		NAQ
4. Not Use of Tutoring Service		NTS
III.	Lack of family support	
1. No parents		NP
2. Live alone		LA
IV.	Persistence in taking math despite failure	
1.	Goal oriented	GO
2.	Good attendance	GA
3.	Willingness to work with teacher	WWT
4.	Trying to do math	TDM
V.	Improvement	
1. Interest to work with classmates		IWC
2. Working with teacher		WT
VI.	College support	
1.	Caring teacher	CT
2.	Academic support	AS
3.	Financial Aid Support	FAS
4. Counseling Service		C