

## ***Presentation at AMATYC 1996***

### **“Getting Students Involved in the Learning of Mathematics, Through a Math Resource Center”**

Presentation for 1996 AMATYC Conference

Libby Holmgren

Math Resource Center Supervisor

Johnson County Community College

Overland Park, KS

(913) 469-8500, x3579

lholmgre@jccnet.johnco.cc.ks.us

#### **I. Introduction**

As those of us in community college mathematics continue to serve students with such diverse backgrounds and headed into such a variety of careers, many changes will be occurring in the next few years. A center such as the math center at JCCC can help facilitate these changes, assisting students in precalculus and calculus as well as those not intending to take calculus - in courses that range from prealgebra through differential equations, to statistics, tech math, business math and more. A variety of teaching and learning methods can be used by our math instructors with a center such as our Math Resource Center for support. In fact, the MRC is a very important part of the math department, and we all work together. Though the center at JCCC has been in existence for 15 years, it continues to change as necessary in many aspects of its operation.

#### **II. What is the MRC?**

The first enclosed sheet gives a brief description of the resources available to the students in the Math Resource Center. A smaller version of this sheet stands up on each table in the MRC, to constantly remind students of what is available to them. Notice the availability of :

- Tutors
- Videos
- Solutions Manuals
- Quiet Room
- Computer Programs
- Study Groups
- Restrictions (are mentioned)
- Hours

What may be not so obvious by reading what is available to students is how the students are actively involved and how they are doing far more than just math problems:

1. Students may meet to work together whenever we are open (65 hours per week).
2. Students may meet to work on coop projects given to them by their instructors - this allows the students a place to work and encourages them to do so. More and more instructors are assigning takehome assignments and coop projects.
3. Students may not reserve a tutor, but instead must be prepared to ask about a specific topic or questions, and then make the most of their time with the tutor, since the tutor will need to move on to others.
4. We hope that math will not always be a singular pursuit, but rather something that can be worked on together with others. We know that in the workplace, this is a necessary skill. However, this type of activity is not always possible in class due to the sheer amount of material that needs to be covered.

5. The MRC is an assistance to instructors in that they do not have to spend time teaching their students how to use the graphing calculators, but instead can send them in to the MRC to learn. For several years now we have held sessions at the beginning of each semester to teach students how to use the TI graphing calculators. 1 year ago I worked with the T.V. department at JCCC to prepare videotapes, so now students can learn about the calculators any time during the semester by viewing the tapes in the MRC.

### III. JCCC

Johnson County Community College is a large community college with 16,000 credit students and 16,000 non-credit students. We are located in a large metropolitan area (Kansas City), in a fairly well-to-do area. There is one campus, with several outreach centers.

### IV. Mathematics Department at JCCC

There are approximately 5000 math students each semester. On the next enclosed sheet, you will notice under "Usage" that at JCCC, 57% of the students are enrolled in classes prior to College Algebra; 28% are enrolled in College Algebra, PreCalc, and Trig; while 15% are enrolled in Statistics, Discrete Math, and Calculus courses. This is probably fairly typical of a community college.

There are 27 full time math instructors, 45 part time and classes are primarily taught in individual classrooms with class size 30 - 35 max.

### V. MRC background

The Math Resource Center has been in existence for 15 years or so, at JCCC, but it has changed tremendously during the years. It began in one room and has moved several times. We started with one table for tutoring and several Apple IIe computers. Our latest move was 3 years ago into our present facility that is approximately 3000 square feet in area and is located in the newest building on campus. When the CLB was built, we were finally able to design our own center and did have a great deal to do with how it is physically laid out. The Math Department and the MRC are located on the second floor of this building with 8 math classrooms on either the second floor or first floor of the same building. Though other math classes are located in other areas of the campus, we are much more visible now and more conveniently located for many students and instructors.

**Before I show the slides, you might want to take a look at the sheet containing the "map" of the MRC. This will give you an idea of what the layout is, as we look at the MRC in action.**

Also, I hope that you'll notice students working with students, students working with tutors, students working with instructors, student working alone. Notice that the tutors are not doing work for the students, but are quite often sitting with their hands on the table. I work with the tutors a great deal on how to involve the students in their learning. I also believe that you will see, even though you are not actually there, that we are providing a non-threatening environment, that in itself encourages students to stay and work on math.

Another statistic which is detailed on the information sheet, is that approx. 2500 math students find their way into the MRC during any semester, and they account for approximately 25,000 hrs. of usage per semester.

You are not familiar with our books, so you will not know, but take my word for it - students in all math classes use the MRC - not just those in developmental classes, not just those in upper level classes, but all students. Note the statistics on this on the enclosed sheet.

### VI. SLIDES

### VII. Tutors

In the information sheets, I have specified that our tutors receive \$6.40 per hour for their work. A condensed

version of my tutor interview form was included at AMATYC, but is not available on the Web version. (Contact me if you wish to discuss the interview form.)

Tutors must have finished Calculus I successfully, though I sometimes make an exception when I am particularly in need of Statistics tutors. (I should have done that this semester!) I consider the tutor interview to be of vital importance, since it is the people in the center that set the tone, and assist the students more than any other resource we have. Potential tutors are asked to explain certain math problems to me during the interview. These problems (usually 6 questions) cover basic math, basic algebra, college algebra, and calculus I.

### **VIII. MRC Facts and Figures**

I refer you again to the information sheet that states the number of tutors we employ per hour and the particular levels of students that use the MRC.

### **IX. MRC Resources**

You'll notice on one of the explanation sheets that there is a description of the rooms within the MRC, should you wish to start planning and need a reference point.

You also have in your possession a list of the videos available to students in our center, as well as a list of the computer programs. If you have further questions on obtaining any of these programs or videos, I refer you to the vendors that are here at AMATYC, or feel free to write, call, or e-mail me at JCCC.

It is so exciting to see students succeed who haven't before. We know this to be the case, because they tell us constantly! It is also exciting to see the new and different teaching strategies that instructors are now incorporating into their teaching and it is wonderful to be a part of the success of these ventures. Because we maintain an atmosphere that is nonjudgemental and encouraging, quiet, and studious, students are able to succeed. Students discover that they are not the only ones with questions, and that even students in classes far beyond what they may be working on also make careless mistakes, or need to be reminded about things they have learned before.

I do have definite opinions about what is most important about starting a center such as this, and would be happy to discuss that with anyone who is interested.

### **X. ADDENDUM**

Two of the topics asked about a great deal during the presentation at AMATYC were "How important is it to have a supervisor," and "How important is it for that supervisor to have a degree in math?" My answer to both is, "It is of ultimate importance!" Why? Here are just a few reasons:

Supervisor?

1. To coordinate needs of instructors and students
2. To maintain a respectful atmosphere in regards to instructors and their assignments
3. To maintain a semi-quiet, definitely studious atmosphere (i.e. It is important to encourage interaction. It is important to discourage non-math discussions. It is important to keep the noise level manageable, so that it doesn't bother other students.)
4. To enforce certain necessary "rules": all students must log-in, no children, no hot food, no tobacco products, no help on take-home tests, no removing MRC resources from the MRC, no talking in the quiet room
5. To have the respect of the math faculty
6. To serve as a mentor for tutors to emulate
7. To keep up on all technology (computer software, calculators, videos) and texts
8. To maintain appropriate resources for all courses as course outlines, books and technology change
9. To be sure that tutors are not staying too long with students doing their favorite problems, at the expense of others
10. To be sure that students in developmental classes continue to receive the time, attention, and respect

- they deserve
11. To be sure that the tutors are treated with respect

Math?

1. To be able to assess the mathematical abilities of potential tutors
2. To have the respect of the faculty
3. To have the respect of the tutors
4. To be able to assess and review software and videotapes
5. To be able to assist tutors with questions they have

**XI. CONTACT:**

Feel free to contact me, or to visit our Math Resource Center in person!

*Libby Holmgren*

#1 AMATYC Conference Handout: This sheet is a general information sheet available to all who come by the center. It is also in a stand on each table in the center.

## **Math Resource Center Johnson County Community College CLB 212**

### **Tutors**

Tutors are available to help you every hour that the Math Resource Center is open, regardless of which mathematics course you are taking at JCCC. The tutors each wear a gold nametag so that they are easy to identify. Since many people use the MRC just to work on their math, you need to indicate when you need assistance by raising your hand. Most tutors can tutor in most courses, but for Business Math, Statistics, Calc III, and D.E., take a look at the "Who Can Help You" signs at the front desk. Don't hesitate to ask for assistance if you need it. Tutors circulate around the room and will help you as soon as they are available. Please work while you are waiting. You may spend as much time as you wish in the Math Resource Center and preregistration is necessary. This is a free service to you.

### **Videos**

Videotapes are available covering nearly every math class taught at JCCC. In addition, there are videotapes to instruct you on the use of the Texas Instruments graphing calculators. In exchange for the video, students need to leave a current driver's license or car keys plus a JCCC I.D. You may view the videos in our video room. Also, many of the videos are available in the library for 1-day check-out. Ask the receptionist which tapes are available for you or read the bulletin board in the video room.

### **Solution Manuals**

A few copies of solutions manuals for each course are available. Not every book company makes the manuals available to us, but you may check out those that we have, for use in the MRC only. Manuals may not be photocopied. In exchange for the manual, students need to leave a current driver's license or car keys plus a JCCC I.D.

### **Quiet Room**

If it is too noisy in the main room, you may want to study in our Quiet Room. However, if you need assistance from a tutor, you will need to come out into the main room.

### **Computer Programs**

There are many computer programs available in our computer room. Some are tutorial, while others are manipulators and graphers. Ask the receptionist what is available for you or read the bulletin board in the computer room. If you need assistance in the computer room, ask a tutor, the MRC computer technician, or a supervisor.

### **Study Groups**

Study groups formed by students may meet in either of the 2 group study rooms in the MRC, any time that the room is not reserved for a regular study group or meeting. If students want an organized study group with a tutor or supervisor to lead it, they should sign up at the front desk. As soon as 5 people have indicated an interest in the same times/days, the group will be set up to meet regularly. At least 3 people must be in attendance for these study groups to be held.

### **Restrictions**

Sorry, but no children are allowed in the center. No assistance is allowed on takehome tests, quizzes, honors contracts, or extra credit. However, if a similar problem is found, assistance will be allowed on that problem. In accordance with JCCC policy, no tobacco or alcohol products are allowed.

## **Hours**

Academic Year: 8 a.m. - 9 p.m., Mon. - Thurs.; 8 a.m. - 4 p.m., Fri., 8:30 a.m. - 1:30 p.m., Sat.  
Summer Session: 8 a.m. - 4 p.m., Mon. - Thurs.

## **Further Information**

Supervisor: LibbyHolmgren  
Math Resource Center phone number: (913) 469-8500, ext. 4242

**Math Resource Center**  
**Johnson County Community College**  
**CLB 212**

**Hours:**

***Fall/Spring***

8 am - 9 pm Monday through Thursday

8 am - 4 pm on Friday

8:30 am - 1:30 pm on Saturday

***Summer***

8 am - 9 pm Monday through Thursday

**Tutors:**

At present, we have approximately 250 hours of tutoring done each week, with 19 tutors:

8 am - 9 am      3 or 4 tutors

3 pm - 4 pm      4 tutors

9 am - 10 am    5 tutors

4 pm - 5 pm      4 tutors

10 am - 11 am   6 tutors

5 pm - 6 pm      4 or 5 tutors

11 am - 12noon 5 tutors

6 pm - 7 pm      3 tutors

12noon - 1 pm   5 tutors

7 pm - 8 pm      3 tutors

1 pm - 2 pm      4 tutors

8 pm - 9 pm      2 tutors

2 pm - 3 pm      4 tutors

The primary qualifications for MRC tutors is that they be high school graduates and have successfully finished either Applied Calculus I or Engineering Calculus I. (During some semesters that we really need statistics tutors, the qualification is either Statistics or the first Calculus course.) Qualified applicants are interviewed by the supervisor. Each interview is typically one hour in length and includes not only the typical interview questions, but also a portion where the applicant is asked to explain several math problems chosen by the supervisor. It is important that the applicant not only be knowledgeable in mathematics, but also be able to explain problems of different levels.

Tutorial assistance is available in the MRC on a drop-in basis - no reservation of tutors occurs. We feel that this makes the students more responsible for their own learning; they must prepare their questions carefully and be prepared to interact with the tutor when he/she is able to work with the student.

**Usage:**

- In a typical fall or spring semester, the MRC is used by approximately 2500 individual students for a total of approximately 25,000 hours of usage in the semester. For comparison purposes it is interesting to note that during the spring of 1989 there were 10,600hrs. of usage recorded.
- 21 different courses are taught in the Math Department at JCCC. Students from all those different classes use the MRC.
- Hours spent in the MRC break down such that 33% are from students in classes prior to College Algebra; 32% are from students in College Algebra, PreCalc, or Trig; and 35% are from students in Statistics, Discrete Math, and Calculus courses.
- However, if we look at the number of people using the MRC, we see that 46% of the individuals are from classes prior to College Algebra; 28% are from College Algebra, PreCalc, and Trig; and 26% are from Statistics, Discrete Math, and Calculus courses.
- Comparing these percentages to enrollment, we find that 57% of the math students are enrolled in classes prior to College Algebra; 28% are enrolled in College Algebra, PreCalc, and Trig; while 15% are enrolled in Statistics, Discrete Math, and Calculus courses.

**Expenses:**

The college has made a major commitment to the support of this center - in excess of \$100,000 per year for personnel. Personnel includes part-time tutors (19 individuals this semester) who are paid \$6.40 per hour, 2 part-time receptionists who each work 30 hours per week at \$5.75 per hour, 1 full-time technician (who keeps everything

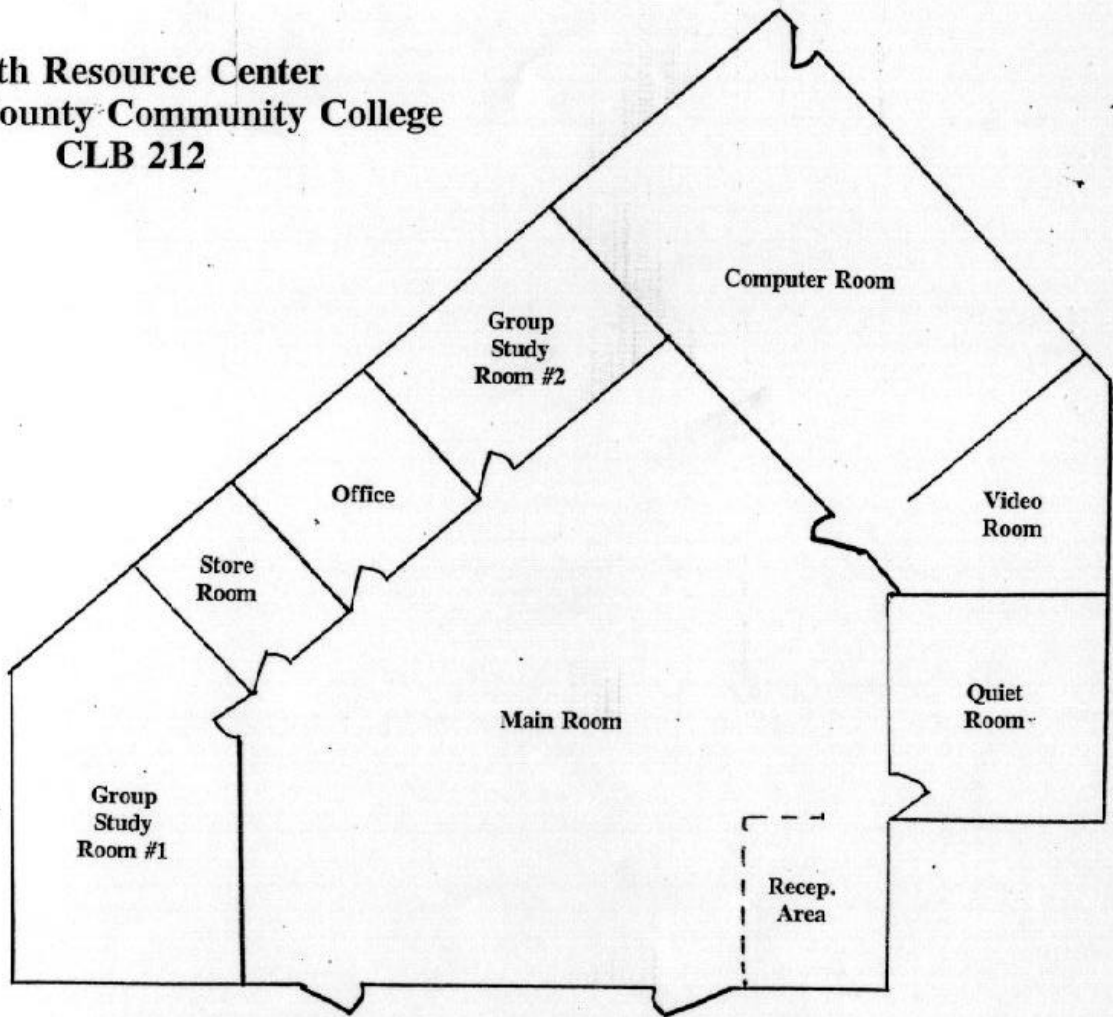
current and in working order in the computer room, makes sure the log-in system is working, and works with all the math faculty with their computers), a full-time supervisor, and assistant supervisors who work nights (Monday through Thursdays) and Saturdays.

**Physical Layout:** A sketch is attached and though not evident on the sketch, there are windows in the hall wall, and between the main room and all the others.

Main Study Area	1400 sq.ft.	There are nine 6' x 42" tables, five 42" x 42" tables, and seating for 75.
Computer Room	690 sq. ft.	There are 22 IBM compatibles: 486DX33, 345 Mb HD, 8 Mb RAM. They are networked to 2 HP laser printers. There is a variety of software, from tutorials to spreadsheets to symbolic manipulators and graphers.
Video Room	180 sq.ft.	There are presently six 1/2" video machines and one 3/4" machine, all with headphones available for student usage. Students may borrow videotapes on most courses from our receptionist, for use in the MRC video room.
Group Study Room#1	280 sq.ft.	This room is for scheduled and impromptu study groups by students, students with a tutor, students with a supervisor, instructors with students, or instructors with instructors. There is a white board all along one wall, and tables and chairs that can be arranged in a U, a square, or whatever is desired.
Group Study Room #2	210 sq.ft.	This room is used for the same purposes as Group Study Room#1 and also has a white board, tables and chairs.
Quiet Room	210 sq.ft.	No talking is allowed in this room, which has 9 study carrels.
Receptionist Area	120 sq.ft.	This area includes the log-in computer facing the students. Then behind the desk there are the solutions manuals, a copy of each text, all the videos, the professional library, a computer, and coat closets for the MRC staff.
Supervisor's Office	110 sq.ft.	
Store Room	64 sq.ft.	

This is a total of 3300sq.ft. (Our previous center was 1800sq.ft.)

**Math Resource Center  
Johnson County Community College  
CLB 212**



#3 AMATYC Conference Handout: **Computer Programs in the Math Resource Center at JCCC** (11/96)  
Software is available on all 22 computers unless otherwise noted.

- *Acrospin* (available on 5 computers)
- Business Math tutorial - corresponding with Harper Collins, Salzman/Miller/Hoelzle's *Mathematics for Business*
- Business Math Spreadsheets (7 modules on all machines) - created at JCCC by Jeff Frost, Gene Legg, and Jeff Hoover
- *Conduit - First Year Algebra* (available on 6 computers)
- *Converge*
- *Derive* and *Derive for Windows*
- Fundamentals of Math tutorial - corresponding to Harper Collins, Clendenen/Kern's *Fundamentals of College Mathematics*
- *Green Globes*, from Sunburst
- *Graphs**Graphs**Graphs*
- *Gyrographics* (available on 6 machines)
- *Intelligent Tutor* - tutorials covering pre-algebra, algebra 1, algebra 2, geometry, trigonometry, Introductory Calculus, and SAT Math
- Internet link
- *LOGOWriter* (available on 6 computers)
- *MathCue* tutorial for Intermediate Algebra, by George Bergeman, corresponding to *Intermediate Algebra - Alternate Approach*, 2nd ed., by McKeague
- *MathCue* tutorial for Trigonometry, by George Bergeman, corresponding to *Trigonometry*, 3rd ed., by McKeague
- *Mathematica*
- *Microsoft EXCEL*, *Microsoft WORD*
- *Minitab*
- *MPP*
- *PC81*
- Texas Instruments *LINK*
- *Word Perfect*

#### #4 AMATYC Conference Handout: **Videotapes available in the Math Resource Center at JCCC**

- “Fundamentals of Math” - provided to go with Harper Collins, Clendenen/Kern *Fundamentals of College Mathematics* (8 2-hr. tapes)
- “Real Life and Its Applications” from Educational Design (covering fractions, decimals, and percents - 16 tapes)
- “Introductory Algebra” - provided by Prentice Hall to go with Blitzer’s *Introductory Algebra for College Students* featuring Peg Greene (9 tapes)
- “Intermediate Algebra” - provided by Saunders and corresponding directly to McKeague’s *Intermediate Algebra - Alternate Approach*, 2nd edition (10 2-hr. tapes)
- “Intermediate Algebra” - provided by Heath and corresponding directly to Larson/Hostetler/Neptune’s *Intermediate Algebra - Graphs and Functions* (10 2-hr. videos)
- “Business Math” - provided for and corresponding to HarperCollins Salzman/Miller/Hoelzle’s *Mathematics for Business* (7 tapes)
- “Survey of Mathematics” - created at JCCC, by Mary Rack and Jean Harpst for the Survey of Math course (3 2-hr. tapes)
- “Tech Math” - created at JCCC, by Carolyn Neptune and Donna Krichiver to cover a number of topics covered in Tech Math I (13 tapes)
- “For All Practical Purposes” - Annenberg/CPB - for use in our Finite Math and Discrete Math (16 tapes)
- “College Algebra” - provided by Heath and corresponding directly to Larson/Hostetler’s *College Algebra* featuring Dana Mosely (17 2-hr. tapes)
- “Trigonometry” - provided by Saunders and corresponding directly to McKeague’s *Trigonometry*, 3rd ed. (9 2-hr. tapes)
- “Trigonometry” - used in our self-paced trig course, from Colorado State University (56 segments of tape)
- “Against All Odds” - produced by COMAP ( 13 2-hr. tapes)
- “Trig Functions and Vectors” from Films for the Humanities and Sciences (18 segments)
- “Statistics” - from Video Aided Instruction (3 2-hr. tapes)
- “Calculus” - from Video Tutorial Service, covering the first semester and a half of Engineering Calculus (17 2-hr. tapes)
- “OhioMATYC” calculus tapes
- TI-81 Video Tutor - Ted Bentley (Worth)
- TI Calculator videotapes:
  - Introducing the Texas Instruments TI-82, parts 1 & 2, featuring Peg Greene
  - Introducing the Texas Instruments TI-85, parts 1 & 2, featuring Sally Fishbeck
  - Introduction to the TI-81 - created at JCCC, by Libby Holmgren

- Introduction to the TI-82 - created at JCCC, by Libby Holmgren
  - Introduction to the TI-85 - created at JCCC, by Libby Holmgren
  - Graphing on the TI-81 - created at JCCC, by Libby Holmgren
  - Graphing on the TI-82 - created at JCCC, by Libby Holmgren
  - Graphing on the TI-85 - created at JCCC, by Libby Holmgren
  - Programming on the TI-81, created at JCCC, by Libby Holmgren
  - Programming on the TI-82, created at JCCC, by Libby Holmgren
  - Programming on the TI-85, created at JCCC, by Libby Holmgren
- *Math Anxiety - We Beat It, So Can You*, from Educational Development Center
  - *Math - A 4 Letter Word* from Public Films, Inc.
  - ACT Math Review, from Video Aided Instruction
  - AMS tapes:
    - *Introducing Mathematica*, Stephen Wolfram
    - *String Theory and Geometry*, Edward Witten
    - *Case Studies of Political Opinions Passed Off as Science and Mathematics*, Serge Lang
    - *Georg Cantor: The Battle for Transfinite Set Theory*
    - *How Computers Have Changed the Way I Teach*, John Kemeny
    - *Indeterminate Forms Revisited*, Ralph Boas
    - *The Flowering of Applied Mathematics*, Peter D. Lax
    - *Modular Elliptic Curves and Fermat's Last Theorem*, Kenneth A. Ribet
    - *Chaos, Fractals and Dynamics*, Robert Devaney