

**PROGRAM REVIEW
MATHEMATICS DISCIPLINE
ACADEMIC YEAR 2001-2002**

Topic I. Where are we now?

A. Purpose & Goals and relation to institution

The Mathematics discipline clearly serves the Riverside Community College District's (R.C.C.D.'s) mission by providing instruction and programs designed to meet the needs of transfer, occupational, technical, and under-prepared students. Specifically, the areas of R.C.C.D.'s mission that are most closely related to the Mathematics discipline's activities are the following:

- "Riverside Community College District is an accessible, comprehensive community college"
The Mathematics discipline strives to provide access to mathematics courses for students by offering additional sections of in-demand courses, increasing class size for redesign courses, providing early morning, night, and weekend classes, and offering online courses. The Mathematics discipline offers multiple levels of mathematics courses serving as prerequisites for courses in the Chemistry, Physics, Engineering, Business, Economics, Nursing, Computer Science, and Social Science disciplines.
- "The District provides transfer programs paralleling the first two years of university offerings"
The Mathematics discipline offers university level courses ranging from Precalculus to Differential Equations, including Survey of Mathematics for pre-credential programs and Statistics for business and social science majors.
- "... the District provides pre-college, tutorial, and supplemental instruction for under-prepared students."
The Mathematics discipline offers summer and weekend mathematics instruction for Upward Bound students, provides drop-in tutorial services in math labs, and provides supplemental instruction through the First Year Experience math cohorts and Study Skills Workshops.
- "The District works in partnership with other educational institutions"
The Mathematics discipline participates in at least ten projects that involve collaboration with other educational institutions, such as California State Polytechnic University, Pomona; California State University, San Bernardino; University of California, Riverside; Moreno Valley School District; Corona-Norco Unified School District; Alvord Unified School District; and San Bernardino Unified School District.

Discipline members encourage students to think critically and to be aware intellectually. The Mathematics discipline embodies the District values of student centeredness and teaching excellence. Discipline members strive to provide an effective learning

environment for students and to exemplify the District traditions of pride, quality, innovation, and professionalism.

R.C.C.D.'s goal #1 – “The District shall improve student retention and success by strengthening certificate, degree, and transfer programs and by establishing new programs and course sequences which lead students to opportunities for transfer education and career preparation” is most closely related to the Mathematics discipline's activities as evidenced in the curriculum advances, work with various learning methodologies, and collaborative efforts enumerated below.

The Mathematics discipline's activities are also aligned with R.C.C.D.'s other goals in terms of providing an effective learning environment, utilizing advances in technology, working with other educational institutions, tailoring programs for a three-campus district, and designing programs relevant to the diverse communities served.

B. History

Prior to Fall 1999, all mathematics faculty across the three campuses were members of one Mathematics Department. As of Fall 1999, new departments of Mathematics, Sciences, and Information Systems were formed at the Moreno Valley and Norco Campuses. Thus, mathematics faculty are distributed across three departments. In order to continue communication and discussion of issues affecting all mathematics faculty, the Mathematics discipline began to meet with a one-day kick-off retreat held at the Mission Inn in Winter 2000. The main purpose of the retreat was to discuss and plan the Elementary Algebra redesign. Since Winter 2000, the Mathematics discipline has selected a discipline facilitator and continues to meet on a regular basis. Mathematics discipline members have identified these efforts at maintaining cohesion as important and positive.

During a similar time period, R.C.C.D. has undergone tremendous growth, increasing from 7,763 FTES in Fall 1998 to 10,810 FTES in Fall 2001. This growth has been accompanied by large increases in the demand for remedial mathematics classes (Supporting data are found in Tables 1 and 2 on page 12 of this document).

In response to these demands, the Mathematics discipline has developed activities and/or projects that fit into the following categories:

- 1) experimentation with alternative methods of delivery,
- 2) collaboration with Student Services to improve student retention/success,
- 3) use of technology,
- 4) learning communities,
- 5) redesign of Elementary Algebra, and
- 6) remaining current in mathematics/mathematics education field.

In the area of experimentation with alternative methods of delivery, the Mathematics discipline has developed online courses for Math 51 – Elementary Arithmetic, Math 50 – Prealgebra, Math 52 – Elementary Algebra, Math 35 – Intermediate Algebra, and Math 11 – College Algebra. In addition to the online method of delivery, for Math 51 –

Elementary Arithmetic, a self-paced and a telecourse are offered. To serve the needs of workforce preparation, Math 62A, B, and C – Mathematics in the Workplace modules were created. A committee is presently working on the creation of developmental mathematics modules to (at least initially) serve the needs of students who earn a borderline score on the computerized placement test, Accuplacer. The Mathematics discipline has also begun to assess through an online survey students' learning styles. Components of the Elementary Algebra redesign course were developed with regard to students' differing learning styles, and faculty members have continued to explore learning styles in this course.

In the area of collaboration with Student Services, the Mathematics discipline has worked very actively and effectively with the Office of Matriculation in choosing the computerized placement test, Accuplacer. The Mathematics discipline is participating in an ongoing validation of the cut scores established for Accuplacer. The discipline is also cooperating with Matriculation in the development of the aforementioned developmental math modules. If a student scores at a borderline level on the Arithmetic or Elementary Algebra subtest of Accuplacer, the student is directed to a diagnostic test to further pinpoint math skill areas that need improvement. The results for these diagnostic tests are then forwarded to the Module Committee to aid in module design and to eventually provide a sample of students with whom to pilot the modules. The Mathematics discipline also volunteered to be the first pilot discipline for Early Alert. In cooperation with the Counseling discipline, the Mathematics discipline has been coordinating and offering mathematics study skills workshops and implemented a successful First Year Experience program.

In the area of use of technology, the Mathematics discipline has continued to offer a laboratory in conjunction with the first and second semester calculus lecture courses. Software, such as Mathematica, and graphics calculators are used with calculus courses. In cooperation with the Physics discipline, a mathematics course based exclusively on the Mathematica software was developed and offered. Graphing calculators are used extensively in some sections of Math 12 – Statistics. As part of the Elementary Algebra redesign, the use of a technology-based learning tool, ALEKS, was introduced. ALEKS (Assessment and LEarning in Knowledge Spaces) is a web-based, artificial intelligence program that generates individualized student assessments, study plans, and active learning sets. “Smart-boards” are also being utilized in some sections of mathematics courses.

In the area of learning communities, the Mathematics discipline has participated for seven years in the QUEST program at Cal Poly Pomona. QUEST – “Quality Unites Engineering and Science Teams” – is a month-long summer residential program in which Latino, African American, and Native American students showing interest in mathematics-based majors are immersed in an integrated curriculum of chemistry, mathematics, and engineering. The Mathematics discipline developed and successfully implemented the Math 52/35 and Math 35/11 strands of the First Year Experience program. A member of the Mathematics discipline obtained a National Science Foundation (NSF) grant to provide scholarships to students with interests in majoring in

mathematics, sciences, or computer science. Scholarship recipients will participate in the Academic Success Project (ASP), a learning community in which students as a cohort will complete mathematics, computer information systems, and guidance courses.

In Summer 2000, the Mathematics discipline was awarded a grant from the Pew Charitable Trust to redesign the Elementary Algebra course. The redesign planning involved the entire discipline and, in particular, involved a “Pew Team” and four committees – Lab Planning, Common Final, Common Syllabus, and Assessment. Mathematics faculty spent Fall 2000 preparing for the pilot of the course redesign. Activities included establishing lab facilities, lab activities, a common syllabus, and common midterm and final examinations. As a part of the redesign, class size was increased from 45 students to 75 students. The discipline was thus able to serve 1836 students (with 26 sections) in Fall 2001 as opposed to 1352 students (with 34 sections) in Fall 2000. During Fall 2000, one course section piloted the Web-based software ALEKS, a major redesign component. A week prior to the beginning of the spring 2001 semester, ten faculty members attended a two-day training session on the redesign and the ALEKS system. During Spring 2001, nine sections (two on the Norco campus, three at Moreno Valley, and four at Riverside City) piloted the redesign with approximately 300 students. During Fall 2001, all Elementary Algebra course sections were taught in the redesigned format – altogether 26 sections with an enrollment of over 1800 students. Extensive assessments were performed for the Spring and Fall 2001 courses. Further assessment details will be provided in Section D of Topic I. For additional information, the grant proposal, midterm report, and a report on initial analyses for Fall 2001 are included in Appendices C, D, and E. The midterm report also contains a cost analysis for Fall 2001. It is interesting to note that the total cost savings of the redesigned course and the total costs for operating the labs on 3 campuses were very close. What is not included in the cost analysis is the amount of money that is being generated for student enrollment in Math 96 or 97, the lab practicum courses. This would mean that the mathematics discipline is actually generating more money for the college by offering the redesigned courses, even with the additional staffing required.

In the area of remaining current in the mathematics/mathematics education field, members of the Mathematics discipline are actively involved in organizations such as the American Mathematical Society (AMS), the Mathematical Association of America (MAA), and the California Mathematics Council for Community Colleges (CMC³). Discipline members have attended the AMS/MAA joint mathematics meetings and a contingent attends CMC³-South each year. Discipline members have given the following presentations regarding the Elementary Algebra redesign:

- 1) On-campus activities
 - a. Presentation to Faculty at large, August 31, 2000
 - b. Presentations to Title III Internal Monitoring Committee, September 7, 2000; April 24, 2001; and January 23, 2002
 - c. Presentation to Riverside Community College Foundation, May 15, 2001
- 2) Presentations at Statewide Conferences
 - a. Presentation at the California Board of Governor’s Conference, Costa Mesa, CA, April 4, 2001

- 3) Presentations at National Conferences
 - a. Title III Annual Conference, Arlington, VA, March 2, 2001
 - b. Pew Grant Program in Course Redesign, Round II Mid-Course Assessment Workshop, San Antonio, Texas, March 14-15, 2001
 - c. State-of-the-Art Technologies – Pew Grant Course Redesign, Dallas, Texas, February 25, 2002.

Mathematics discipline members have also presented at several District Flex workshops.

C. Programs & Curriculum

In recent years, the Mathematics discipline has created new courses to meet the needs of the student populations it serves. These new courses include:

- Math 50 – Prealgebra,
- Math 11 - College Algebra,
- Math 7 – Mathematica,
- Math 3 - Linear Algebra,
- Math 62A,B,C - Mathematics in the Workplace,
- Math 96 - Math Center Practicum (1/2 unit),
- Math 97 - Math Center Practicum (1 unit), and
- Math 98 – Academic Excellence Seminar (First-Year Experience).

By bridging Arithmetic to Elementary Algebra, Prealgebra serves the needs of many developmental students. College Algebra serves the needs of students transferring in non-science majors. Mathematica and Linear Algebra are courses designed primarily for mathematics and physical science majors. Mathematics in the Workplace is a set of modules designed for CalWORKS students. The Math Center Practicums are vehicles for students to access the instructor, computer, and tutorial resources of the math laboratory. Math 98 is in the process of being dropped from the First-Year Experience but may be used with the NSF-sponsored Academic Success Project.

At the time of this writing, three new courses are under consideration and/or development. These are a study skills course, a liberal arts math course, and a statistics workshop course to be taught jointly with members of the Psychology discipline. A committee is also designing math modules for developmental-level topics.

All mathematics course outlines were revised and approved by the Curriculum Committee in its December 12, 2000 meeting. Course outlines are in Appendix A. Content Review and Grids for Prerequisite Validation are in Appendix B. In the Curriculum Committee meeting of November 27, 2001, Math 9 – Introduction to Scientific Computer Programming and Math 60 – Math for Engineering Technology were deleted from the mathematics curriculum. In the same meeting, College Algebra, Intermediate Algebra, Elementary Algebra, and Elementary Arithmetic were approved for Distance Education. In the Curriculum Committee meeting of December 11, 2001, a change to increase Math 36 – Trigonometry from a 3-unit to a 4-unit course was approved.

The Mathematics discipline provides course sequences to meet the needs of developmental mathematics students (Elementary Arithmetic – Prealgebra – Elementary Algebra – Intermediate Algebra). The discipline provides courses for the non-science major transfer student (Statistics, College Algebra, Finite Mathematics, A Survey of Mathematics, and Calculus, A Short Course). The discipline also provides courses for students planning to transfer with majors in mathematics, sciences, or engineering (Trigonometry, Precalculus, Calculus I, II, and III, Differential Equations, and Linear Algebra). The discipline created course modules for Workforce Preparation students. Elementary Arithmetic serves the needs of those students planning to enter the Nursing program.

Through the use of a computerized placement test and multiple measures, prerequisites and mandatory placement have been implemented for most courses in the Mathematics discipline. In Spring 2000, a prerequisite was established for Math 52 – Elementary Algebra. In cooperation with the Office of Matriculation and the Office of Institutional Research, course placements are being validated at the time of this writing and will be validated thereafter on an every-other-year cycle.

In regards to learning objectives for the Mathematics Program, a review of course outlines indicates that discipline members agree that, regardless of course level, applying mathematical principles and techniques to the solution of applications is an overarching goal for mathematics courses. Using the symbols and vocabulary of algebra to clearly communicate mathematical concepts is also a very important goal.

D. Student Outcomes Assessment

As a part of the Elementary Algebra redesign project, an elaborate assessment plan was designed and implemented for Math 52. See Appendix C – Pew Grant Proposal, pp. 10-13 for the Math 52 assessment plan. The majority of full-time faculty in the discipline were involved at some level in the assessment. Data for analysis of Spring and Fall 2001 student learning outcomes were gathered via administration of a pre-test and a 45-question common final. The pre-test, administered at the beginning of the course, consisted of 20 questions taken directly from the common final. For the Fall 2001 data sets, six learning objectives from the elementary algebra course outline mapped to specific pre-test and post-test questions. Hence, sub-scores were calculated for these learning objectives.

T tests were run comparing traditional and redesign common final means and sub-scores. With the exceptions of learning objectives 4 and 5, redesign students' scores were significantly higher than traditional students' scores. The topics corresponding to learning objectives 4 and 5, graphing linear equations and factoring polynomials, respectively, are covered near the end of the course. In the shortened lecture format of the redesign course, these topics may not have had as much lecture time devoted to them as the earlier topics had.

For the redesigned course, learning gains were calculated utilizing the pre- and post-test sub-scores. Again, t tests were run comparing pre- and post-test measures. In all cases, learning gains were statistically significant.

Overall, it appears that, based on available data, students in the redesign format were learning more than students in the traditional format for the majority of learning objectives. See Appendix D – Pew Midterm Report and Appendix E – Elementary Algebra Student Learning Outcomes for Fall 2001 for details of analyses and results.

In addition to the assessment in content areas, other assessments for Math 52 included surveys of student learning styles, math attitudes, and use of services. Both faculty and student focus groups were convened at the end of the Spring 2001 semester. Based on information obtained from focus groups, mathematics faculty members made a number of changes in the redesigned course structure. The biggest change was a move to require that students spend a minimum of two hours per week in math labs to increase the amount of interaction among students and instructors. Another important change was to find ways to better integrate redesign course components by augmenting web-based homework, which was not necessarily related to lecture topics, with homework each week that related more closely to lecture material.

As for further assessment plans, the discipline is considering developing common finals for Math 51 – Elementary Arithmetic and Math 50 – Prealgebra. Particularly for Math 51, discipline members would like to compare the various methods of delivery. Two mathematics faculty members are involved in the District Classroom-based Assessment Project and will be implementing classroom-based assessment projects for Intermediate Algebra and Statistics.

E. Collaboration with Other Units

The Mathematics discipline is very involved in collaborative projects with other units. As mentioned earlier in this report, the Mathematics discipline has worked and continues to work closely with the Office of Matriculation on Early Alert and placement validation. In Fall 1999, the Riverside Mathematics Department developed a booklet on math in the workplace for the Associate Vice President of Occupational Education. The Mathematics discipline collaborates with Tutorial Services on the staffing of the math labs and on group review sessions for Math 52. In designing the math labs, the math discipline also collaborated with the Office of Matriculation, Facilities, and other disciplines. The following projects/activities have involved collaboration with other disciplines:

- 1) Study Skills Workshops – Counseling,
- 2) Worksheet development – Chemistry,
- 3) Mathematica course – Physics,
- 4) Logic Course – Philosophy,
- 5) First Year Experience – Counseling,
- 6) Math courses for Occupational Areas – Construction, Auto Mechanics, and

7) Academic Success Project – Computer Information Systems,
Counseling.

A member of the Counseling discipline is invited to and often attends Mathematics discipline meetings.

F. Outreach

In addition to collaborating with other units within R.C.C.D., the Mathematics discipline collaborates with other educational institutions and the community. The Mathematics discipline offers summer and weekend math instruction for Upward Bound students. The discipline is collaborating with Cal Poly Pomona in the Quest Program and Academic Success Project. In partnership with U.C.R., the Mathematics discipline provided an Algebra Institute for elementary and secondary teachers from the Corona-Norco Unified School District, the Alvord Unified School District, and the San Bernardino Unified School District. The primary goal of the Institute was to assist elementary and secondary teachers with algebraic thinking and understanding. Discipline members collaborate with transfer institutions in programs to streamline the transfer process for students. Specifically, discipline members participate in the Intersegmental Major Preparation Articulated Curriculum (IMPAC) Project. IMPAC is a unique intersegmental, faculty-designed and faculty-run project to ensure that students transferring from the community colleges to UC and CSU are prepared for work in their chosen major and can avoid having to repeat coursework. Math faculty members also participate in UCR's Community College Faculty-to-Faculty Conference.

In the area of mathematics teacher recruitment and preparation, the discipline is initiating involvement in the Blended Program sponsored by the Alpha Center at UCR. The Alpha Center sponsors the Community Teaching Fellowships in Mathematics and Science Program, a part of an overall master plan to improve K-12 mathematics and science education in the Inland Empire. Members of the discipline have served as mentors for future community college instructors through the Riverside Community College District's Inland Empire Faculty Internship Program. In cooperation with area four-year colleges and universities in the Inland Empire, this program provides developmental opportunities for persons interested in pursuing a community college teaching career.

The Mathematics discipline has supported the efforts of the Welfare-to-Work Program by creating mathematics modules for math in the workplace. A math faculty member is assigned to provide instruction for students in the CalWORKS and New Visions Programs.

In recruiting students for the NSF-sponsored Academic Success Project, members of the discipline have been working closely with local high school districts, such as the Moreno Valley School District. Some R.C.C.D. mathematics courses are offered in local high schools in the Norco area.

G. Resources

The Moreno Valley Campus currently has four fulltime faculty and thirteen adjunct faculty. Three of the four fulltime faculty have reassigned time totaling approximately 1.0 FTE. The Norco Campus has eight fulltime faculty and twelve adjunct faculty. Of the eight fulltime faculty, one faculty member is also assigned to the Physics discipline and one is on a one-year temporary assignment. The Riverside Campus has fourteen fulltime faculty and eighteen adjunct faculty. Of the fourteen fulltime faculty, two are in one-year temporary positions and one is assigned to CalWORKS. Faculty on the Riverside Campus have reassigned time totaling over 2.0 FTEs. With the continued growth in the District, it has become more and more necessary to hire adjunct faculty. However, with the many mathematics tenure-track hirings in California over the past two years, it has become more and more difficult to find adjunct faculty. Also, there is a continual problem of finding available adjunct faculty to staff the winter intersession as most of the adjunct faculty have teaching assignments close to 1.2 FTEs for the academic year, leaving no room for additional FTEs during winter. Overall, according to data compiled by the Office of Program Assessment and Accountability (Feb. 2002), the percentages of FTEs taught by fulltime faculty in the Mathematics discipline have been 36.04%, 42.72%, 43.38%, and 45.94% for Fall 1998, 1999, 2000, 2001, respectively. These percentages include fulltime faculty members' overload assignments in the part-time FTEs.

On the Moreno Valley Campus, the facilities are adequate, with the exception of several rooms that need immediate attention in terms of ventilation. The math lab facility on the Moreno Valley Campus is, at the present time, barely adequate in size to accommodate student demand. The lab is filled to capacity during the majority of lab hours and during peak hours (before and after morning classes Monday through Thursday) students have to wait for an available computer for testing and/or a seat for tutoring. On the Norco Campus, the Mathematics discipline is currently using ten classrooms, including classrooms at Norco High School and Norte Vista High School. There is no dedicated math lab with expanded hours as HUM 103 is shared with lecture classes. On the Riverside Campus, the Mathematics discipline is very much in need of classroom space. Only three classrooms are dedicated to mathematics, two of which are not adequate for the math class sizes. The large majority of math classes are presently capped at forty-five; holding classes with forty-five or more students in Life Sciences 204 and 205 does not create an optimal learning environment as the classrooms become very crowded. The discipline shares two classrooms with Chemistry, two with Geology, and two with Physics. The discipline also uses the Board Room for the Math 52 redesign classes which are capped at 75 students. PS 102 is currently used as a math lab for Calculus and Arithmetic classes. Riverside Campus math faculty members have requested that this lab be converted to a classroom for math use. Calculus and Arithmetic labs will be moved to the redesign lab, which is currently adequate on the Riverside Campus.

On the Moreno Valley Campus, the equipment in the math lab is, for current use, adequate although the CPUs are old and slow. Plans should be made for updating of equipment as future software needs may require newer technology. Some classrooms

have LCD projectors, but classrooms are lacking internet connections. On the Norco Campus, each classroom has a whiteboard, TV and VCR, and working overhead projector. Some classrooms have computers and projection units. The Norco Campus also has one TI-82 with a view screen and two TI-83+ calculators with view screens. Eighteen graphing calculators are available for instructor and student use. HUM 103 has computers and a Softboard. On the Riverside Campus, the redesign lab has adequate computers. As with Moreno Valley, classrooms in Riverside are in need of updating in terms of technology.

The District has maintained or developed auxiliary resources for some projects/programs. However, there does not seem to be a clear procedure for requesting funding for the development of such resources. The discipline recommends that a procedure be put in place with a formula for determining which projects get funding priority.

H. Other Comments

N/A

I. Overall Assessment of Discipline Performance

Discipline members completed the individual rating exercise described in the Self-study Resource Guide. The rating exercise included individually answering questions, as a group discussing answers to questions, and reaching consensus on overall “grade” for the discipline. During the month of January, discipline members were given the opportunity to address the following questions individually:

- 1) What areas of the District’s mission, vision, and strategic goals are most closely related to your discipline’s activities?
- 2) What are some of your discipline’s key activities and projects over the past five years (examples)?
- 3) How do you “grade” (A, B, C, etc.) your discipline’s performance on the top 5-10 activities and projects?
- 4) What evidence/documentation would you offer/collect to support these conclusions?
- 5) Overall, how would you “grade” (A, B, C, etc.) your discipline?

Individual responses were submitted to the discipline Facilitator. The Facilitator mailed to all members of the discipline copies of responses received along with initial data from the Office of Program Assessment and Accountability. At the first discipline meeting of the spring semester, discipline members discussed their answers to the questions:

- 1) Why did each person “grade” (A, B, C, etc.) as he/she did?
- 2) What did the “grades” mean to each person?
- 3) How did the discipline achieve the “grade” given?
- 4) How could it achieve a higher “grade”?
- 5) Should “grades” be adjusted in view of the discussion?

Based on the exercise, the discipline agreed to “grade” itself with an A-. The most comprehensive response was used as the main vehicle for the discussion and is included in Appendix F. The Mathematics discipline’s accomplishments have already been

delineated in this document. Discipline members identified a great deal of evidence to support this grade – course outlines, Curriculum Committee meeting minutes, discipline meeting minutes, Elementary Algebra redesign assessments, qualitative and quantitative data from the Office of Matriculation and the Office of Institutional Research, ALEKS statistics, instructor reports, surveys from participants and students attending workshops, institutes, and courses, and focus group data. Members of the discipline identified the discipline's strengths as the commitment of faculty to students and to the institution and as the willingness to compromise and experiment with new ideas if these ideas are deemed to be in the best interest of students. The major area that needs to be improved is communication within the discipline, especially given the move to three colleges.

Topic II. Where do we want to be?

A. Environmental Scan

According to data provided in Appendix A (p. 56) of Enrollment Simulation & Planning: Enrollment Analysis & Forecast – Riverside Community College District, Final Report, December 2001 prepared by Charles McIntyre, R.C.C.D. had an enrollment of 23,262 students in Fall 1998 and an enrollment of 29,257 students in Fall 2001. These numbers reflect a 26 % increase in enrollment. In Appendix G (p. 83), Scenario C Forecast Results from the ESP Model, McIntyre projects an enrollment of 37,258 students for Fall 2006. Under this scenario, enrollments will increase by 27%. Overall, the Mathematics discipline has grown from an enrollment of 6175 students in Fall 1998 to an enrollment of 7844 students in Fall 2001. This 27% growth has mirrored District growth. Over the same time period, growth patterns at the Moreno Valley and Riverside Campuses have been similar. Moreno Valley had a mathematics enrollment of 1189 in Fall 1998 and 1471 in Fall 2001 (24% growth). Riverside had a mathematics enrollment of 3306 in Fall 1998 and 4039 in Fall 2001 (22% growth). The Norco Campus has had a larger percentage of growth in mathematics enrollments. Norco had an enrollment of 1680 in Fall 1998 and 2334 in Fall 2001 (39% growth). For Fall 2001, the Mathematics discipline produced 993.5 FTES, the largest of any discipline in the District. Given the appropriate resources, the Mathematics discipline could grow to meet the increasing demands of students being placed into remedial courses.

Since the implementation of the Accuplacer computerized placement test on July 1, 2001, there has been a noticeable shift in placement results for mathematics. Table 1 shows mathematics placement by year at R.C.C.D. from Jan 1998 to June 2001. These data were provided by the R.C.C.D. Office of Program Assessment and Accountability.

Table 1. Math Placement by Year at R.C.C.D., Jan. 1998 to June 2001.

| | 1998 | 1999 | 2000 | 2001 | Total |
|---------------------------------------|---------------|---------------|----------------|---------------|-----------------|
| Indeterminate (had to retake test) | 1001 11.4% | 1187 12.6% | 1483 14.0% | 722 12.9% | 4393 12.8% |
| Math 10 | 824 9.4% | 843 8.9% | 390 3.7% | 89 1.6% | 2146 6.2% |
| Math 1A | 281 3.2% | 352 3.7% | 372 3.5% | 209 3.7% | 1214 3.5% |
| Math 4/5/11/12/25/36 | 424 4.8% | 519 5.5% | 964 9.1% | 715 12.8% | 2622 7.6% |
| Math 50/51 | 1497 17.0% | 1432 15.2% | 1611 15.2% | 774 13.9% | 5314 15.5% |
| Math 52 | 3291 37.4% | 3609 38.3% | 4058 38.4% | 1939 34.7% | 12,897 37.5% |
| Math 53/35 | 1474 16.8% | 1437 15.3% | 1683 15.9% | 1133 20.3% | 5727 16.7% |
| Math 53/4/5/11/12/25 | | 42 0.4% | 9 0.1% | | 51 0.1% |
| Total | 8792 100% | 9421 100% | 10,570 100% | 5581 100% | 34,364 100% |

Table 2 shows mathematics placement at R.C.C.D. from July 1, 2001 to March 23, 2002. These data were provided by the Office of Matriculation.

Table 2. Math Placement at R.C.C.D., July 1, 2001 to March 23, 2002.

| | N | Percent |
|----------------------|-------|---------|
| Math 50 | 474 | 3.7% |
| Math 51 | 5037 | 39.1% |
| Math 52 | 4278 | 33.2% |
| Math 53/35 | 2768 | 21.5% |
| Math 4/5/11/12 | 147 | 1.1% |
| Math 4/5/11/12/25/36 | 13 | 0.1% |
| Math 25/36 | 86 | 0.7% |
| Math 10 | 46 | 0.4% |
| Math 1A | 33 | 0.3% |
| Total | 12886 | 100% |

Prior to July 1, 2001, approximately 17% of students tested placed into college-level math and over 80% of students placed into developmental mathematics. Since July 1, 2001, 97.5% of students tested have placed into developmental mathematics classes.

Of particular note is that placement into Math 51 – Elementary Arithmetic has increased from approximately 15% to 39%. The Mathematics discipline is working with the Office of Matriculation and the Office of Institutional Research to validate the current placement scheme.

Additional data from the Office of Program Assessment and Accountability show that the number of sections and average enrollment per section for Elementary Arithmetic have both increased from 1998 to 2001. Successful completion data from Fall 1999 to Fall 2001 indicate that Elementary Arithmetic and Elementary Algebra had the lowest student success rates. Both courses averaged approximately 50% of students successful. However, within the District, over 40% of students indicate a goal of transferring to a four-year institution. It appears that many students have a distance to go in the area of mathematics in order to reach their goals. The remedial issue is also compounded by the one-year rule of the California State System. Students with remedial needs who begin at a California State University have one year to complete these remedial needs. Many of the students who don't meet the Cal State requirement may matriculate to community colleges to take remedial courses.

The implications of growth within the District and of increasing remedial needs of students are significant. The Mathematics discipline will be hiring five new faculty members in Spring 2002 (1- Moreno Valley, 3-Riverside, and 1-Norco). One of the new faculty hires for the Riverside Campus will be in a one-year temporary position. Using a 27% growth figure, the Mathematics discipline projects a need for a minimum of eight additional tenure-track positions by 2006. These eight need to be new hire positions in addition to any replacement positions.

The increasing needs for remediation will require the Mathematics discipline to continue to explore creative and innovative ways to meet these needs. The discipline has already begun these explorations with the Elementary Algebra redesign. The discipline is presently working on the concept of math modules and has plans to redesign the Elementary Arithmetic course. Resources needed to continue exploring modes of delivery to accommodate the increasing numbers of remedial students will be discussed under Topic III. Despite the glaring placement test results, the Mathematics discipline resolves to hold constant the transfer function and meet the needs of students both placing into or progressing through the system into college level courses.

B. Internal Review

The Mathematics discipline would like to address the following issues/questions within the next five years:

- 1) Remediation issues
 - a. Should Math 50 – Prealgebra have a prerequisite of Math 51 – Elementary Arithmetic?
 - b. Are enough sections of Math 51 being offered?
 - c. How effective are current course formats for remedial courses?

- d. How can the math discipline not only maintain but also increase the role of lab coordinators?
- 2) Communication and course offerings across three colleges
 - a. How can the discipline effectively and efficiently maintain one curriculum?
 - b. What courses need to be offered at each college in terms of General Education and higher level math courses?
 - c. What are some creative means for offering lower enrollment courses across three colleges? (e.g., videoconferencing for Differential Equations)
 - d. How can the discipline prioritize projects and get more faculty involved?
- 3) Successful completion rates
 - a. Will Early Alert help to decrease the number of F's seen in the math grade distributions?
- 4) Dissemination of information
 - a. How can the discipline more effectively disseminate information from conferences?
 - b. How can the discipline motivate more faculty members to participate in professional development activities?
 - c. How can the discipline more effectively disseminate information to adjunct faculty?

On a slightly different note, the Mathematics discipline strongly recommends that the District implement the waiting list option available in Datatel. Such a feature would be very helpful in planning future course offerings and in evaluating access to math courses.

C. Vision

The Mathematics discipline would like to evolve into an organizational unit that, in the best interest of students, communicates and cooperates across three colleges in efforts to address in creative ways the overriding issues, such as remediation, that face R.C.C.D. The discipline has already begun to address the remediation issue with the Elementary Algebra redesign. Plans are to continue offering Elementary Algebra in this format and to continue assessing student learning in the redesigned course. The discipline has set immediate goals (see pages 15 and 17 in this self-study) to help with communication and dissemination of information across the three campuses and within individual departments.

D. Gaps between current and desired state

Communication remains a problem. The Mathematics discipline created an electronic bulletin board over a year ago (at the time of this writing) which has been virtually unused. With the complexities of faculty schedules and workload, it has become increasingly difficult to hold face-to-face discipline meetings.

Using traditional courses designs and available resources, the Mathematics discipline cannot meet the ever-growing demands for remediation.

Topic III. What do we need to do to get there?

A. Initiatives, strategies, goals, & activities

A general course of action that would begin to move the Mathematics discipline towards its vision would be to achieve agreement on the prioritization of projects and on the desire to communicate effectively and maintain a unified curriculum.

Specifically, the Mathematics discipline has established the following goals:

- 1) Create a climate for technology-based communication,
- 2) Maintain cohesion of curriculum,
- 3) Explore creative ways to offer courses across three campuses,
- 4) Continue with increased participation work on modules,
- 5) Expand redesign-type offerings,
- 6) Continue to work on Early Alert,
- 7) Offer study skills course, and
- 8) Hold Brown Bags and additional Flex opportunities.

With respect to goals for student learning, an analysis of course outlines shows the Mathematics discipline has one goal that is common to all courses – apply mathematical principles and techniques to the solution of applications. As noted earlier, using the symbols and vocabulary of algebra to clearly communicate mathematical concepts is also a very important goal. In an effort to help under-prepared students, the discipline has also adopted a goal of helping students become better college students. Initially, the discipline has been working on this goal by offering study skills workshops. Future plans include offering a stand-alone study skills course and covering study skills concepts in conventional courses, particularly developmental ones. Improved study skills is an outcome that will benefit students during their tenures at R.C.C.D. and at four-year institutions to which they may transfer.

B. Resources

Many activities are already underway to achieve goals and objectives established by the Mathematics discipline. A committee is working on module development, and redesign options are under consideration for additional developmental courses, particularly Elementary Arithmetic. Such efforts are time-consuming, requiring research on products and techniques and development of common syllabi, midterms, finals, and other assessments. The redesign efforts for Elementary Algebra required well over a year of time and effort from many math faculty members. In order to accomplish such goals, continued and even greater faculty involvement is required. Incentives such as special projects funding or reassigned time will more than likely be needed to accomplish developmental course design goals. Course redesign goals will also require the continuation of the lab coordinator positions on the three campuses. At the present, lab coordinators are faculty members with .6, .4, and .4 reassigned time for Riverside, Moreno Valley, and Norco, respectively. Pew Grant and Title III monies funded these

positions. The Mathematics discipline desires to continue the existing Elementary Algebra course redesign and math lab services and plans to offer additional courses in the redesign format and in modular format. In order to accomplish these goals, the lab coordinator positions may in fact require increased reassigned time. Existing lab areas will need to be maintained and, within a few years, expanded to meet the increasing demands for remediation. On the Riverside Campus, plans for the renovation of the existing Martin Luther King Library include the use of the third floor as laboratories for Mathematics, Sciences, and Nursing, with the understanding that Nursing will eventually move to a new building. These plans are adequate for the Riverside Campus math lab; however, future plans are unknown for the Moreno Valley and Norco math labs.

In order to facilitate offering higher level math courses (e.g., Linear Algebra) using videoconferencing, at least one small room on each campus needs to be equipped with state-of-the-art videoconferencing equipment.

Several of the goals of the Mathematics discipline will not likely require additional resources but will require motivation, time, and effort on the part of faculty (e.g., communicating via bulletin board, maintaining curriculum cohesion, holding Brown Bags).

Topic IV. What evidence do we need to track our progress?

Course assessments using components of the Pew assessment model along with data re course offerings, numbers of students served, retention, and successful completion will be used to monitor progress in the developmental curriculum. Grade distributions will be monitored and studies will be conducted by the Offices of Matriculation and Institutional Research to document effects of Early Alert. Communication efforts can be monitored electronically. Efforts to maintain curricular cohesion can be tracked through discipline meeting minutes and Curriculum Committee meeting minutes.

The Mathematics discipline does have an in-depth assessment plan for Math 52 – Elementary Algebra. Most portions of the plan have been implemented. Work will continue in Spring and Fall 2002 to complete its implementation. Individual faculty will have in place classroom-based assessment plans for courses in Fall 2002. Discipline members plan to assess student learning in additional redesign courses and modules as such courses become available.

Topic V. How can we improve the discipline self-study process?

Discipline members agreed that data presentation could be improved by providing summary tables, charts, etc. Most individuals required education regarding the interpretation and uses of the data and felt they could use even more education. Involving newer faculty in a meaningful way was difficult in the process. This last issue

may continue to be a problem as newer faculty simply do not have the context from which to address many of the questions. However, newer faculty may have a vision and ideas for the future of a discipline and can provide such contributions.

Activities for Academic Year 2002-2003

- 1) Discuss at first discipline meeting of fall semester importance of/issues involved in the following:
 - a. Using technology-based communication in lieu of some face-to-face meetings
 - b. Maintaining cohesion of curriculum
 - c. Exploring creative ways to offer courses across three campuses (Goals 1,2, & 3)
- 2) Designate full-time faculty member to maintain discipline list serve/bulletin board and to (at least initially) encourage faculty (via e-mail) to check the board (Could this count towards Flex time for the faculty member designated?) (Goal 1)
- 3) Offer Math 105 – Workshop in Math Anxiety/Study Skills (Goals 2 & 7)
- 4) Prepare Study Skills course outline for submission to Curriculum Committee (Goals 2 & 7)
- 5) Recruit additional faculty members to work on math modules (Goal 4)
- 6) Continue development of math modules (Goal 4)
- 7) Pilot several math modules (Goal 4)
- 8) Assess redesigned and traditional Elementary Algebra courses (Goal 5)
- 9) Realign redesign efforts across three campuses (Goal 5)
- 10) Experiment with redesign model in Elementary Arithmetic and Intermediate Algebra (Goal 5)
- 11) Present to R.C.C.D. faculty re Early Alert (Goal 6)
- 12) Hold Flex workshops on graphing calculators and web-based programs for math (Goal 8)

Additionally, the discipline would like to create a handbook for math adjunct faculty.

Institutional Issues

- 1) Implement the waiting list option available in Datatel