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ABSTRACT

This report provides an overview and results of a state-level summative review undertaken to examine issues affecting program leaders and planners within the mathematics divisions/departments of Florida's 28 community colleges, make recommendations for changes and funding priorities, identify areas of need, observe trends, and highlight concerns among mathematics department chairs and faculty. A survey was conducted of 55 campus sites, yielding 42 responses. In addition, in-depth interviews were conducted with chairs and faculty at four selected colleges, representing rural, city and urban campuses. An analysis of issues produced a total of 18 recommendations in the areas of access, assessment, articulation, curriculum, instruction, faculty, students, special students/special programs, multiculturalism, and the Division of Community Colleges. Overall, it was found that the mathematics departments performed well, providing such valuable programs as academic support laboratories, self-paced courses, video reinforcement for classes, and special courses in college survival. Areas of concern discovered during the review include student unpreparedness, the growing inability to effectively meet the needs of increasing numbers of learning disabled and English-as-a-Second-Language students, the effect of budget cuts on statewide articulation agreements, and the growing number of adjunct faculty teaching courses. A list of references, recommendations and advisory committee members; the survey instrument; mean test scores for mathematics; and a selected bibliography are appended. (MAB)

FLORIDA STATE BOARD OF

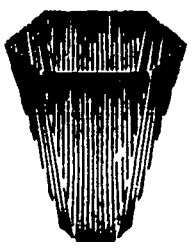
COMMUNITY COLLEGES

MATHEMATICS

INSTRUCTION

Program Review Report

March 1993



State of Florida
Department of Education
Tallahassee, Florida
Betty Castor, Commissioner
Affirmative action/equal opportunity employer

State Board of Community Colleges

Summative Review

of the

Mathematics Program

in

Florida Community Colleges

March 1993

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INTRODUCTION

The State Board of Community Colleges reviews instructional programs on a five-year cyclical basis (Sections 240.147(5) and 240. 312, Florida Statutes, and Rule 6A-10.039, FAC). The mathematics program review report which follows is in response to the five-year requirement and is summative in nature encompassing the community college mathematics divisions/departments as a whole.

The review process is conducted in three separate phases referred to as levels. Level I includes data displays produced by the Division of Community Colleges comparing the performance of community college graduates in upper division programs with native students and other students of the university. Level II reviews are conducted by the community colleges themselves in targeted disciplines. These reviews are often triggered by Level I data displays and involve in-depth analysis of disciplines by community college and university faculty. Level III reviews are conducted at the state level and focus on statewide, issue-oriented, and policy-oriented perspectives and are coordinated with the five-year reviews of the Board of Regents.

With regard to mathematics requirements, public, postsecondary education in Florida stipulates in Rule 6A-10.030:

(2) Prior to receipt of an Associate of Arts degree from a public community college or university or prior to entry into the upper division of a public university, a student shall complete successfully the following:

a) . . .

(b) Six (6) semester hours of mathematics coursework at the level of college algebra or higher. For the purposes of this rule, applied logic, statistics and other such computation coursework which may not be placed within a mathematics department may be used to fulfill three (3) hours of the six (6) hours required by this section. For the purposes of this rule, a grade of C or higher shall be considered successful completion.

In addition, Rule 6A-10.0314 requires that students must also secure adequate skills to pass the College Level Academic Skills Test (CLAST) which defines minimum competencies in communication and mathematics that must be met before an individual is awarded an associate in arts degree.

PURPOSE

The primary purposes of this summative, state-level review were to examine issues that impact community college leaders and planners within the mathematics divisions/departments, to make recommendations for policy changes and for funding priorities, to identify areas of need, to observe trends, and to highlight thematic concerns among division/department chairs and faculty members within the mathematics divisions of the State Community College System. The report was generated through qualitative research techniques, a procedure widely respected in the social sciences. Such research, advocated by Patton (1980) and Lincoln and Guba (1985), promotes the idea that there are multiple realities or truths. These truths reside "within the perceptions, behaviors, actions, and values of the persons and/or cultures being studied" (Fleishman, 1991, p. 43). Qualitative research is exploratory and descriptive in nature, the object being to uncover those multiple realities and make sense of them. Consequently, this report attempts to capture the multiple realities (views and perceptions) of division/department chairs and faculty in mathematics regarding access, assessment, articulation, curriculum, instruction, faculty, students, special needs, and emergent concerns.

PROCESS

The information contained within the review was obtained by utilizing a combination of survey responses from the twenty-eight Florida community colleges and in-depth interviews at selected community colleges throughout the state. The survey responses were supplied by division/department chairs in mathematics with input from faculty members at the various campuses. A total of forty-two responses were returned from fifty-five possible campus sites, a response rate of 76 percent. The interviews with chairs and faculty members were conducted at four institutions selected on the basis of geographical location and represented rural, city, and urban campuses. The four colleges were Broward Community College in Ft. Lauderdale, Chipola Junior College in Marianna, Hillsborough Community College in Tampa, and Central Florida Community College in Ocala.

An advisory committee which included representatives from public schools, vocational institutions, community colleges, and universities was formed to assist in the program review process. (See appendix 2 for the membership, p. 69.) The advisory committee provided input on the survey instrument and draft copies of the report, supplied references, and fielded questions as they arose. In addition, information was obtained from various agencies within the Department of Education (DOE) which included the Office of Assessment, Testing, and

Evaluation; the Division of Universities; the Office of the Comptroller; and within the Division of Community Colleges, the Bureau of Finance and Business Services and the Bureau of Information Systems. The contributions of the advisory committee and the numerous educational agencies are gratefully acknowledged.

ANALYSIS OF ISSUES

Access

Access and student readiness. The concept of open access or the open-door philosophy which is so near and dear to proponents of the community college movement has been illusive and has changed over time (Deegan, Tillery, and Associates, 1985, p. 19). In the 1960s and 1970s, it meant: "To be successful the colleges should maintain a balance between their efforts to attract new students and their capacity for placement, instruction, and curriculum development" (Cohen and Associates, 1975, p. 160). Moving through the 1980s and into the 1990s, however, social values changed and that balance has been jeopardized due to increased numbers of students enrolling at community colleges who are underprepared or unqualified to meet the academic challenges that confront them. Faculty and division/department chairs attest to the fact that approximately 50 percent of their students need some developmental or remedial help in mathematics before pursuing college-level classes. The question of who should have access and at what degree of proficiency has yet to be definitively answered.

The State Board of Community Colleges has endorsed, encouraged, and supported the concept of increased interaction among community college, high school, and middle school faculty and administrators. The goal of such

interaction should be to promote greater understanding of what is expected and required of college-level students. Fundamentally, teachers, parents, and students at high school and middle school levels need to be aware that community college students need the same level of readiness as any high school student going directly to the university upon graduation.

Researchers have also reached "the widespread conclusion . . . that better articulation between high schools and colleges is a high priority and that community colleges have a major obligation to establish smooth connections to enhance the flow of more students through the system" (Deegan, et al., 1985, p. 39).

Barriers to successful access noted by respondents were the following types of situations: having students who were below college-level ability enrolled in college-level classes; having students with special learning problems, including English as a second language (ESL), learning disabled, and emotionally disturbed students; having students who failed a course repeat the same course countless times; and having students drop out because they could no longer afford to stay. Addressing such barriers to access should be a priority.

It seems reasonable that community college leaders and planners would develop access policies and procedures that are consistent with their educational mission and that hold firmly to established standards of the college.

1. Recommendation. It is recommended that a task force comprised of community college and Division representatives meet to develop policy guidelines with regard to access and student readiness for college.

Access and respondent views. The issue of access emerged as a concern for survey respondents especially in light of the severe budget cuts affecting virtually all of Florida's educational institutions. It appears that student access to mathematics courses has already been impeded and even tighter restrictions are anticipated by both division/department chairs and faculty in 1992-93. Of the survey respondents, 67 percent indicated that students "usually" had access to the courses when they needed them while only 33 percent indicated students "always" had access to the necessary courses. Based on interview responses, smaller community colleges suffered the consequences of recent budget cuts more than larger institutions and admitted having to deny students access. Interviewees at two of the smaller institutions indicated that access was seriously affected at their colleges because they simply did not have the money or faculty resources to offer more sections of college mathematics. One respondent indicated that class size was increased from 22 to 35 students, and only three mathematics courses were offered during the 1992 summer session due to the budget shortfall. A reduction in summer offerings negatively affects access in that it interrupts the sequence of courses students must take. A disrupted sequence generally results in students taking longer to complete their programs. Increasingly, students are taking three years to complete a two-year degree.

Another respondent said that budget cuts resulted in the loss of a full-time mathematics position, the loss of adjunct faculty, fewer sections being offered with more students in each section, and the cancellation of 10-12 sections of

mathematics during the spring semester of 1992. In addition, no overloads were allowed for full-time faculty, a first since the respondent had been at the college. Student demand for mathematics courses is exceeding the limits at some institutions in college preparatory mathematics, intermediate algebra, college algebra, and statistics. Others are increasing class size beyond the 22 specified in the General Appropriations Act in order to accommodate student demand.

Respondents strongly felt that improving access could best be achieved by four primary methods: (1) increasing the number of faculty; (2) adding more sections; (3) having students who are better prepared for college mathematics, and (4) securing full funding for college preparatory students. Other recommendations for improving access included securing more state-level "funding for resources and facilities (particularly computer facilities)" and for "space allocation sufficient to lift enrollment cap;" updating the college catalog to reflect requirements at state universities; offering courses through different formats, i.e., television and/or distance learning; improving assessment and placement procedures, and increasing the quality of advisement of students.

Access and student financial aid. Another vital aspect of the access issue involves the availability of student financial aid, especially for those who are financially needy. According to a recent report by the Postsecondary Education Planning Commission (PEPC), there has been a shifting away from need-based programs to merit-based programs (Student Access to Higher Education, 1991). The report states:

> Most disturbing . . . is the inconsistency between financial aid policy and state action in terms of the allocation of resources between need-and non-need-based programs. Financial aid programs can continue to reduce financial barriers and thereby enhance access to higher education only if state budget appropriations go primarily to need-based aid programs. The FSAG [Florida Student Assistant Grant] program, in particular, needs to be funded at a level sufficient to provide students with awards that meet their financial needs. (p. 37)

As an indicator of the degree of financial need, 35,000 community college students applied for FSAGs during the current academic year. Of that number, 17,000 were deemed eligible to receive funds, but only 8,000 received allocations. The remaining 9,000 applicants represent Florida's unmet student financial aid needs with regard to FSAG funding.

2. Recommendation. It is recommended that student financial aid budget requests continue for financially needy students and that community colleges continue to search for alternative sources for scholarship/grant money, i.e., foundations and private donors, thereby helping to lift financial barriers for needy students.

This study indicates that open access is threatened for several different reasons. First, students often limit their own access to college-level courses by being underprepared for college work. Second, financial restrictions have prevented the hiring of additional faculty and the offering of additional sections of mathematics courses in several of the community colleges. Third, because of a change in the focus of financial aid packages to merit-based awards, some financially needy students are, in effect, being denied access. Unless the financial resource picture changes statewide, this threat to open access is likely to continue.

Assessment

Over 95 percent of respondents indicated that the mathematics divisions/departments conduct assessment primarily through a combination of placement test scores, an analysis of high school transcripts which reveal how many mathematics courses were completed, and previous grade point averages. Overall, however, there was wide acceptance of placement test scores as being a valid indicator of where students should be placed in spite of the degree of complaints mathematics professionals expressed regarding the inadequacy of the placement test itself. (See p. 13 concerning complaints/limitations of current placement tests.) As students enroll in subsequent college-level mathematics courses, faculty also assess by analyzing whether the student has had the necessary prerequisite courses for the class under consideration. A few respondents indicated that they administered a review test covering prerequisite material the first week of class. Others did informal assessment through conversations with the student.

Other forms of assessment frequently mentioned were common final examinations within departments/districts/college campuses, a grade of C or better in the prerequisite mathematics course, and occasional group projects presented to the class.

If the placement examination should misplace a student, virtually all of the colleges have procedures to allow that student to be more appropriately placed. Some institutions require that the student retest for proper placement. Others use

the first week of classes for diagnostic testing from which final decisions regarding student placement are made. In many cases, the student is sent to the department chair who counsels the individual into the proper level. Most colleges attempt to accomplish these changes during the first week or two of class, but some are flexible enough to allow the student to make the change anytime during the semester. Students who are moved to a lower level course, which happens much more frequently than a move upward, are "encouraged to use appropriate academic support service such as labs and tutors." One respondent indicated:

> If a student is misplaced in a Prep. course, he/she is given the opportunity to take the cumulative exams for the class. If the student passes all of the cumulative exams, he/she has completed the Prep. requirement. If a student is misplaced in a higher level mathematics class, he/she is transferred to a lower level class.

Placement examinations. Interviewees and survey respondents were generally dissatisfied with the current placement test situation. The state system currently recognizes four tests for placement purposes: ACT, SAT, ASSET, and MAPS or its computerized version referred to as CPT. Part of the difficulty with these choices is that none of these tests necessarily correlate with one another nor do they measure the same competencies in the same manner. Hence, there is a lack of consistency statewide with regard to placement. Another frequent complaint voiced about these tests is that they are not good predictors of student success. For those colleges using MAPS, there is dissatisfaction with the cut score. Many feel cut scores are too low thus allowing students access to mathematics courses for which they are not prepared. There was a strong feeling

among faculty that accurate placement with appropriate cut scores would do much to assure student success in their entry-level mathematics courses.

A possible solution to the placement problem is on the horizon. Efforts are underway at the Department of Education (DOE) to develop a statewide placement exam that will be a more effective measure or indicator of student preparedness for college success and also will alleviate some of the confusion statewide with institutions selecting from among five different placement examinations, all of which have limitations and shortcomings. Department/ division chairs and faculty were receptive to the idea of using a common placement exam and would welcome its implementation. The schedule follows but delays are being experienced:

1. The request for proposals is out as of the writing of this report.
2. Contract approval with selected testing agency - April 1993
3. Test becomes available - September 1994
4. Computer adaptive version available - June 1995

Once the new placement test is implemented, an effective assessment system should be in place statewide which will include the Grade Ten Assessment Test (GTAT), the common placement test, and CLAST. In the spring of 1992, high school students began taking the GTAT. The purpose of this assessment test is to identify the student's level of skill in mathematics and English. Results of the GTAT will allow the student to know how well s/he is progressing toward college-level competencies. If the student does not perform well on the GTAT, s/he has two years of high school to concentrate on improving his/her level of performance. Therefore, the GTAT could well serve as an early warning for

college-bound students. Then, at college entry, the common placement exam will also examine student understanding in relation to mathematics and English as does the CLAST at college exit. Consequently, all three tests will be related to one another with respect to the competencies covered and should provide valid indicators of assessment and achievement.

3. Recommendation. It is recommended that the Grade Ten Assessment Test (GTAT) be used as an early warning signal to stimulate college-bound students to accomplish the levels of competency required for college entrance mathematics while they are still in high school.

With regard to longitudinal follow-up, most mathematics personnel indicated they relied on Level I data displays supplied by the Division. (See Appendix 5, p. 81) Level II reviews at the institutional level also allow the colleges to take an in-depth look at their respective programs in mathematics and to develop plans/goals to meet needs or to solve problems. Some survey respondents indicated that their institutions did do some degree of follow-up on students after they left the campus. However, the majority of the follow-up activities were done by the Office of Institutional Research rather than at the departmental level. Some departmental efforts are now being made at some institutions to track the performance of students who begin in college preparatory classes. Other informal attempts at tracking students through their programs have been made sporadically, but usually time and budget constraints prevent departmental tracking efforts from being incorporated on a regular basis. Since mathematics division/department chairs and faculty members are keenly aware of

the kinds of follow-up data that would be helpful to them and since the type of information will vary from college to college, it is anticipated that divisions/ departments will collaborate with institutional research divisions to determine how that information can best be generated and by whom. The Accountability Plan, scheduled for full implementation in 1994, and the Master Plan, currently in the process of being updated, will undoubtedly serve as indicators of the kinds of data that will be essential. Mathematics divisions will want to pay particular attention to the monitoring of college preparatory success rates within their institutions as well as CLAST performance of mathematics students who have accumulated 60 hours of credit, regardless of when they first sat for the test.

Assessment and CLAST. The CLAST examination serves as both an exit assessment and an outcome. Recent data on CLAST test results for the year 1992 reveal that the passing rate for mathematics was 75 percent. (See Appendix 4, p. 79) Those rates have been relatively consistent over time, with approximately 25 percent of students failing the mathematics section of the CLAST. Reconciling the numbers failing the mathematics section of CLAST is sometimes difficult when contrasted with passing grades earned in mathematics courses. Survey respondents also indicated that at some colleges students are encouraged to take CLAST at the earliest opportunity which may be before they have had the necessary courses to cover the competencies. Consequently, some students are taking the exam before they have had a review of the content to be covered and do not perform very well. For the most part, however, mathematics professionals

are convinced that the mathematics courses offered in the general education core do cover CLAST competencies but also move well beyond them since they are viewed as minimal competencies.

Because so many students tend to fear math and lack confidence in their abilities, it is essential that initial assessment of their abilities be as accurate as possible. Current statewide cut scores are intended to be minimal thus allowing for students who may be weak at entry but are able to make rapid progress. However, it is not intended that students be placed in a class where they are guaranteed to fail. Consequently, until the common placement exam is available for use statewide, it is recommended that institutions take advantage of the flexibility they already have to increase cut scores on the current mathematics placement exam to a level they feel would more realistically reflect the skill levels needed for success in college algebra.

4. Recommendation. Until such time as the common placement test is implemented statewide, it is recommended that institutions exercise their option to raise cut scores on the current mathematics placement tests in use to a level they feel is more appropriate for success in college algebra.

Articulation

Survey respondents were asked whether they met with faculty and/or representatives of secondary, vocational, and upper division institutions to discuss common programmatic concerns. Table 1 indicates the results. It can be inferred from the percentages in table 1 that articulation efforts in the mathematics divisions/departments appear to be almost evenly distributed between secondary

schools (46 percent) and upper division institutions (45 percent). The table indicates that 46 percent of the respondents answered "yes" to the question, "Do you meet on a regular basis (at least once a year) with your counterparts at the high school level?" However, it can be inferred that the remaining 54 percent have little or no interaction. It is strongly recommended that schools who have engaged in a meaningful communication process continue to do so, and that institutions who are not currently participating make such interaction a priority. Such involvement is essential for improving the quality of education in general and to ensure a better prepared student at entry to college.

Table 1

Degree of Community College Interaction
with Other Educational Institutions

	With High School Representatives	With Vocational Representatives	With Upper Division Representatives
Yes	46%	14%	45%
No	54%	86%	55%

According to Dr. Laurey Stryker, Chair of the DOE Articulation Coordinating Committee, strong state-level energies are currently directed toward improving the preparedness of secondary students as they move into postsecondary institutions. Special efforts are being made to meet with counselors and faculty at secondary institutions to impress upon them the kinds

of knowledge and general academic expectations college faculty have of entering freshmen. Ideally, if entry test results indicate deficiencies, students should have opportunities to remediate before entry to the college. The new GTAT, discussed on p. 14, may prove to be just the vehicle to provide early opportunities for remediation.

Based on the information in table 1, it appears that interaction with vocational centers is minimal. Some respondents indicated that the recent tech prep emphasis is providing impetus for greater interaction and communication with vocational schools, but the process is only beginning. Tech Prep Associate Degree (TPAD) is an alternative program offered to high school students in a 4 + 2 or 2 + 2 configuration. It involves rigorous course work in mathematics, science, English, and computer technology. The program requires two years of postsecondary study. Courses are taught in an applied manner and students receive hands on experience in their field of specialization. Successful model TPAD programs around the country have demonstrated significant increases in SAT scores by participants and boasted as much as a 27 percent increase in the number of participants enrolling in community college programs as compared with high school students completing a general program. Early indicators are that this program has potential for significantly decreasing the numbers of students requiring college preparatory course work upon entry to college. For that reason alone, the tech prep program deserves the support of the community colleges.

Some schools have excellent articulation with university counterparts to aid transfer students while other colleges have next to none. Reactions representative of the respondents to the articulation efforts were:

> --Articulation efforts have aided with dual enrollment course selection, quality control and dual enrollment courses, and some curriculum redesign related to program efficiency (math education through Central Florida Consortium of Higher Education).
>
> --Faculty are more aware of math requirements for specific majors so students are better advised. [The college] offers all math courses needed for all majors (in 1st 2 years). Interaction with high schools allow students to be better prepared for college.
>
> --We have met with high school faculty and with upper division faculty at annual consortium meetings which include neighboring community colleges, universities, and high schools. These meetings provide articulation between schools for better continuity with course work.
>
> --While there are not faculty-to-faculty meetings, the department via individual faculty members is involved with both university level faculty and secondary school teachers.
>
> --Co-advisement helps our students know what to expect from nearby universities and what they need to take at the community college. We have an articulation officer who helps keep our students and faculty aware of university requirements. Counselors have made high school students more aware of our program.
>
> --High school teachers can advise their students to take the proper math courses to enter the community college. Because of our "open door" policy, students many times think they do not need algebra in high school. These articulation meetings help high school personnel to realize that while we let anyone in, we do have exit standards that must be met. Students would be advised to complete algebra in high school so that when they enter a community college, they are ready for college level work rather than having to go through the prep program.
>
> --It is difficult to say what the impact of our meetings with the staff of our district high schools has been. We have only been conducting these meetings the last two years and the feedback we have received has been mixed. Some of the staff have expressed positive feelings after these

sessions. Others have told colleagues that we were just trying to get them to teach our exit exam (the CLAST).

--Few meetings--thus little impact.

--Students always benefit when they have the latest information about what is expected on the next level of their education. Since requirements change frequently, I think it is very important for community college personnel to meet with university personnel on a regular basis.

While articulation efforts are well underway at many community colleges, there is room for improvement at all levels. The 2 + 2 concept in Florida between universities and community colleges is likely to receive continued emphasis with larger numbers of students being referred to community colleges due to overcrowding and tightened budgets at the state's nine universities (Mercer, 1992). Thus, the transfer process to the upper division should allow students to move through the system with a minimum of difficulty and/or redundancy. Based on survey responses, increased efforts are still needed to make high school students, parents, faculty, and administrators aware of what level of student performance is expected at entry to college. Mathematics faculty also made the following types of recommendations for improving interaction among the various educational institutions:

--Exchange teacher programs. We have had at least one faculty member involved in the exchange teacher program with a university.

--The articulation meetings that are held with articulation officers should be continued. Also, the special "articulation days" held at four-year universities are very beneficial. They should be continued.

--Meetings between high school faculty and community college faculty to specifically discuss curriculum and methods of instruction would be

helpful. Workshops on the uses of technology could be used at all levels and would open communication between all groups.

--Explore expansion of dual enrollment opportunities with high schools, the TECH-PREP concept with vocational centers, and greater access to undergraduate instruction with universities.

--I would like to see some of the pre-planning time at secondary institutions used to dialogue with teaching faculty . . . Curriculum concerns could be discussed [and] potential problems could be worked out.

--We have just begun to utilize a Dual Enrollment Coordinator and a Tech Prep Coordinator--both of whom work for the local school district and the community college.

--There should be a representative from each high school or a mechanism for insuring that all information and concerns reach all faculty at each level.

--College faculty participate in secondary in-service days; interaction with faculty at senior institution.

--Convey concerns through chairpersons. Provide **funds** and **time** for **regular** meetings.

--The high schools, local university are less interested in communication than we are--at least that is my perspective.

--Once or twice a year host an informative seminar at the community college for all area schools to develop awareness of the opportunities available at the community college level.

In May of 1991, an ad hoc committee on articulation issues, chaired by Dr. Kay Heimer, president of Lake City Community College, submitted guidelines to the SBCC for improving articulation. Those guidelines are summarized as follows:

1. Provide for an ongoing exchange of ideas and information.
2. Establish joint program agreements.
3. Facilitate the efficient and cooperative use of resources.

4. Encourage an outreach across each level of education and into the communities served.
5. Utilize the state Articulation Coordination Committee as specified in SBE Rule 6A-10.024(2).

5. Recommendation. It is recommended that administrators and faculty alike implement and follow the May 1991 guidelines of the Ad Hoc Committee on Articulation which advocated increased interaction between and among public schools, area vocational centers, community colleges and upper division colleges.

6. Recommendation. In support of the SBCC's recommendation that high school students who are college bound be required to take college preparatory courses, it is recommended that community colleges assume a pro-active role in relaying that information to parents, students, administrators, and faculty at both middle school and high school levels.

In a culture that is increasingly dependent on information, there is an increasing need for added education, training and re-training, and lifelong learning. In that context, different educational agencies cannot operate in isolation. Rather, increasing dialogue needs to take place to assure that the educational missions of each are understood and a means is found to serve students in such a way that doors are opened to allow for career progression as well as career change.

Curriculum

Rule 6A-10.030, commonly referred to as the Gordon Rule, clearly states that in order to be awarded an A.A. degree students must successfully complete six semester hours of mathematics at the level of college algebra or above. In exploring reactions from practitioners on how the Gordon Rule and CLAST have influenced the mathematics curriculum, responses were abundant and varied. For

the most part, math faculty agreed that the Gordon Rule has upgraded the mathematics curriculum since the community colleges now must require the students to take six credit hours of college-level mathematics. In addition, Intermediate Algebra (MAT 1033) no longer qualifies as a college-level algebra course at some institutions. A consequence of the Gordon Rule has been more students enrolled in mathematics courses, especially at the remedial/college preparatory level. Also, the Gordon Rule and CLAST appear to have spurred the development of new courses designed to fulfill general education requirements. Chief among these courses are Finite Mathematics (MGF 1207), Fundamentals of Math (MGF 113) and Principles of Math (MGF 114). The first two courses place heavy emphasis on reviewing essential mathematics competencies covered on CLAST while MGF 114 includes algebra among other math concepts. Even though MGF 113 and MGF 114 do qualify for general education credit, community colleges are cautioned to be vigilant about assuring that college-level standards of rigor are maintained in these courses.

Math professionals had mixed reactions about the merits of Gordon Rule and CLAST. Several mathematics respondents questioned the value of both.

> --We have concentrated our efforts heavily on weaker students struggling to satisfy Gordon.
>
> --The Gordon Rule has dominated the mathematics curriculum.
>
> --[The Gordon Rule] has possibly narrowed the curriculum and forced students to follow a particular mathematics track.
>
> --Our general education requirements in math are at a higher level now, but lots of schools have used "less than" college algebra to meet this rule.

--The Gordon Rule has enlarged the group of students needing remedial mathematics skills instruction . . . the curriculum has been required to reinforce CLAST skills (minimum competency) . . . in addition to presenting material useful for transfer students in engineering and other hard science areas.

These negative reactions and others suggest that faculty are so preoccupied with the less academically prepared student and stressing minimum competencies that students who are ready for college-level work and who should be challenged to reach for maximum competencies may no longer be the focus of faculty efforts. This is frustrating to both faculty and college-level students.

However, contrasting views were expressed by several faculty who had strong praise for the Gordon Rule and CLAST, crediting the rule and the exam for empowering faculty and challenging students. The quotations which follow illustrate the point.

--I'm amazed that many community colleges fault CLAST. We think CLAST is great! It gives us a reason for holding [the student's] feet to the fire. We can say to the student, "You can't beg me to let you get by. I'm here as your mentor to get you ready. I'm not here as your judge and jury." It has really made a difference.

--It was the impetus needed to upgrade the GER [general education requirements] for mathematics.

--Students now need a C rather than a D to be successful in a mathematics course.

--It has enhanced the math curriculum. While still not meeting the "spirit" of the Gordon Rule, our program is better because of it.

--The Gordon Rule raised the level of math and, thus, the math skills of each of our students. We changed our curriculum so that students could learn the skills that are necessary for them to be successful in their Gordon Rule math courses and future courses that depend on these [skills].

Overall, the mathematics curriculum is quite stable with the typical array of courses consisting of three to five different levels of college preparatory mathematics courses for students whose math competencies are deficient, plus the following college-level courses: college algebra, pre-calculus, calculus, trigonometry, discrete math, differential equations, linear algebra, finite math, statistics, and selected business and technical mathematics courses. It is primarily through these courses that the necessary mathematical competencies leading toward the associate in arts degree are taught. If students do not obtain the necessary understanding through classwork alone, the community colleges have done an exceptional job in providing a host of ways for students to reinforce the necessary mathematical skills in order that they will have every opportunity to prepare themselves for the CLAST examination and for eventually obtaining the A.A. degree. In addition to classroom work, they have academic support laboratories where they can receive individualized instruction from qualified instructors, special peer tutor programs, workshops, review sessions, video tapes, software, and practice tests--all designed to help students succeed.

New courses added to the curriculum during the past academic year include courses that focus on the use of graphics calculators, math thinking/reasoning skills, and review of CLAST skills. Some of the community colleges have expanded their offerings by adding pre-calculus and/or the entire calculus sequence, and several schools have had to expand the number and level of college preparatory mathematics courses. Relatively few courses have been

dropped during the past year. The most frequently cited courses to be dropped were those relating to math education. Other courses dropped tended to be upper level math courses such as Discrete Math or Linear Aigebra due to lack of sufficient numbers of students enrolling in them at some community colleges.

Curriculum strengths. When faculty and division chairs evaluated the strengths of their current curriculum, 60 percent indicated that the greatest strengths were a combination of quality faculty and a diverse and flexible curriculum. When a varied curriculum is combined with uniform standards, syllabi, textbooks, course content, and exit examinations, practitioners feel that curriculum standards will be met, especially if faculty have high expectations regarding student performance. A healthy ratio of full-time to part-time faculty is also essential to maintain curricular strength and integrity. If the balance becomes distorted with a heavy reliance on part-timers, there is a perception by faculty and students that quality suffers. This is an issue that administrators will need to monitor closely since it affects both quality of instruction and faculty morale factors.

Equally important to having high caliber faculty was having the ability to maintain diversity in the curriculum. Faculty valued being able to offer a wide array of courses in a variety of modes and in a sequential manner. The following quotation from a dedicated math instructor illustrates the point:

> The greatest strength of the mathematics curriculum is the variety of classes we offer to meet very specific needs. Small colleges must teach in a way useful to students in the future. If we have to cut back and give

everybody the same six hours of math, we're going to teach students to hate mathematics. As Florida becomes increasingly high tech and we train students for high tech jobs, many of which are aimed at protecting our sensitive environment, we are going to have to make people mathematically literate, but we're going to have to do it in a way that makes students proud of themselves. I don't want budget cuts to take away diverse offerings in diverse formats (i.e. calculators, computer labs). When that happens, it's debilitating to both students and faculty.

Curriculum content. According to survey respondents, curriculum content in mathematics is determined primarily through the collaborative efforts of the faculty or by the individual instructor with reinforcement through a published syllabus. Also influencing the shape and direction of the curriculum were the mission/purpose of the college, the textbooks, state guidelines, district committee guidelines, and mathematics competencies required for the CLAST even though the total curriculum far exceeds the competencies measured on the CLAST. The Gordon Rule has affected the mathematics curriculum significantly since the mid-1980s. It has been the catalyst for increasing the number of credits required in mathematics and along with CLAST has become the standard means of measuring minimal competencies for A.A. graduates. While the rule was not popular with all practitioners in the field, many professionals will admit that it has helped students to realize that they must accomplish at least minimal standards.

Several mathematics professionals were disturbed that some community colleges are still awarding college credit for MAT 1033, Intermediate Algebra. They strongly felt that for consistency of the curriculum statewide, MAC 1102, College Algebra, should be universally recognized as the first college-level

course. They were equally adamant that MAT 1033 should appropriately fall into the category of college preparatory work. The frustrations they expressed with regard to MAT 1033, cut scores that are too low, the failure of students having the necessary prerequisites, and the general lack of student readiness at entry--all clearly indicate that the time has come for more stringent standards with regard to access and curricular expectations. In keeping with that premise is the following recommendation:

7. Recommendation. It is recommended that MAT 1033 be uniformly reclassified as college preparatory instruction.

Curriculum enrichment. In terms of enriching the curriculum, 95 percent of the respondents indicated that additional computers, computer software and hardware, plus more graphing calculators would most benefit their curricular efforts. Graphing calculators are in particularly high demand by faculty for two reasons: (1) they are powerful teaching tools, and (2) they are needed "to meet recommendations of the NCTM [National Council of Teachers of Mathematics] curriculum standards." Several respondents indicated more computer mathematics laboratories were needed to allow students opportunities for reinforcement and to learn at their own pace. Others mentioned the need for increased computer networking capacity, more quality instructional software, more access to printers, and a need for personal computers for each faculty member. In addition to enriching through technology, respondents indicated that textbooks and faculty are becoming more applications oriented in the way materials are presented. More

needs to be done in that regard, however, since by their own indication faculty are still lecture oriented.

Relevancy of the curriculum. Math professionals are frequently criticized for not teaching math in meaningful and relevant ways. Asked how mathematics instructors at the community colleges are addressing that problem, respondents voiced the following:

-- Teaching across the curriculum approaches.

-- Students select projects of interest to them in some classes. An emphasis on applications in basic mathematics is aimed at showing students the relevancy of math in their lives. In some classes students are assigned to write word problems.

-- Textbooks are now written with more application problems.

-- Approaches vary among faculty members but use of applications is encouraged. Newspaper articles as well as magazine articles discussing the relevance of mathematics are circulated.

-- Faculty have had students work on projects in algebra and statistics courses that relate to everyday activities. Charts have been provided that emphasize the advantages of mathematics knowledge in earning and positions relative to career choices.

--Faculty feel that work is needed in this area. Some approaches currently used include social research (STA 2014) and applied math scenarios (MAC 2233).

--Mathematics instructors through their individual teaching methods are constantly providing students with examples of real world applications of mathematics.

--Video presentations such as "Against All Odds" in statistics. Utilizing problem-solving teams that tackle real-world situations.

--Speakers from the community. Films (Math--Who Needs It? Stand and Deliver). Videos. Applications with Graphing Calculators and Computers. Group and individual projects.

--Faculty incorporate physics videos, calculators, and newspaper articles into their classes. They also participate in outside activities such as Space Camp and student summer camps.

According to mathematics researchers, the best way to promote relevancy within the curriculum is to "explore effective alternatives to 'lecture and listen' and to involve students actively in the learning process" (Counting on You, 1992, p. 22). The Tech Prep program is modeled on the practical application of skills in the work setting and may help set the pace for alternative ways to obtain mathematical competencies. Faculty need to be aware of the possible merits of this approach.

Curriculum and college mission. The following quotations are taken from the survey responses and reflect the answers of department chairs and faculty in mathematics to the question, how does the mathematics curriculum help to carry out the mission of the college?

--The mathematics curriculum provides a program to prepare students to continue their education beyond the junior college level as well as providing courses which lend themselves to applications in life for those students who do not seek further formal education.

--Our ten department goals are all directly tied to the stated mission of the college.

--By providing equal access opportunities, assisting in developing skills and problem-solving ability to compete in a technologically changing environment and preparing students so that they are successful if they choose to transfer.

--Provides for the general educational needs of the students in mathematics which are basic to effective living in a democracy. Provides a foundation for study in the upper division of a college or university. Provides preparation for entrance into full-time employment with due regard for the occupational requirements of the local community.

--The mathematics curriculum attempts to take any student enrolling at [the college] and deepen their understanding of the unique role that mathematics plays in their experiences. They are challenged to think critically and logically. They are further challenged to become productive members of our society.

--The mathematics curriculum assists individuals in developing academic excellence by providing university parallel, technical, and continuing education courses. The mathematics curriculum is designed to prepare students to respond to the demands of today's rapidly changing society and the technological advances of the future.

--It provides entry level courses for the under-prepared student and the growth potential to continue. The prepared student enters at his placement level and can continue to prepare for university-level mathematics. It prepares the non-major for CLAST competencies required to meet the articulation agreement to the State Universities.

--The curriculum provides opportunities for all students to be successful in mathematics preparation for achieving a degree or for meeting their needs as a citizen.

Certainly, curriculum is the vehicle by which mission is transmitted to the student and the community. Consequently, congruence between mission and curriculum is essential as a measure of institutional effectiveness. While mission statements generally are lofty and philosophical, the curriculum becomes one of the practical means by which mission can be realized. Effective institutions will want to see that mission is repeatedly articulated, examined, and discussed so that curricular goals are consistent with it. In that regard, mathematics departments/

divisions should be looking at mission and curriculum and asking, "What does the math curriculum cause the student to do? How does it do that?" Exploring answers to those questions gives rise to others.

1. Do we have agreement on core mathematical competencies deemed essential for all students or do we still promote minimal mathematics for the many and advanced mathematics for the few?

2. Are these core competencies consistent with national mathematical goals and with our local institutional mission?

3. Do we have enough flexibility to tailor curriculum to the needs of our community and yet challenge students to the highest mathematical attainment needed for twenty-first century life demands?

4. How effective are we as faculty in providing a practical "hands-on, minds-on" approach to problem solving?

5. What kinds of competencies should faculty have in this age of technology and how can we get them?

The National Research Council (NRC) and the National Council of Teachers of Mathematics (NCTM) have strongly advocated curricular change by adhering to a strong core of mathematics and have lobbied for the elevation of standards nationwide. They are also calling upon high schools to require that their college-bound students take algebra and geometry, and even calculus when they plan on math-based careers. Community colleges are advised to stay abreast of the recommendations of these councils and to strive to meet or exceed the goals they have established. The NCR's report Everybody Counts (1989) states:

> Most students who enter postsecondary education must study further mathematics, either as part of a general degree requirement or as a prerequisite to their particular course of study. In this regard, vocational-technical institutes, community colleges, continuing education, and adult education programs are no different from four-year colleges and

universities. Most courses of study have some kind of mathematical prerequisite and most students find that they need additional study of mathematics to meet these prerequisites.

Over three quarters of the degree programs at most universities require courses in calculus, discrete mathematics, statistics, or other comparable mathematics. These subjects are required because they introduce students to functions, to relations among variables. The language of change and chance is conveyed by the symbolism of functions. College students need this level of mathematical literacy in order to understand with precision the mathematical ideas that form the foundations for science, business, and engineering courses. . .

Nine of every ten mathematics course enrollments in higher education are in elementary calculus, in elementary statistics, or in courses that are prerequisites to these subjects. Prerequisite courses are normal parts of the secondary school curriculum and should, if at all possible, be studied there rather than in college. . . (p. 51).

The rationale for more stringent curricular standards in mathematics is forcefully made in the preceding quotation and should prompt practitioners to be unrelenting in advocating higher standards and higher expectations of students at entry to the community college.

Instruction

Survey respondents were asked to indicate what methods of instruction were used most frequently in their mathematics courses. The tally which follows indicates the frequency of responses for a given instructional method.

Table 2

Frequency Indicators on Use of Various Instructional Methods

Instructional Method	Number	Percent
Lecture/discussion	36	85.7
Lecture	24	59.5
Laboratory	19	45.2
Learning laboratory - independent study	13	30.9
Group projects	12	28.5
Other (workshops, tutoring, computer support, videos, etc.)	04	09.5
Non-laboratory independent study	10	23.8
Televised instruction	6	14.2

Although a variety of other approaches are reflected, the responses indicate that the traditional lecture/discussion approach predominates with 85.7 percent of the respondents indicating it was the method used most frequently. While lecture/discussion certainly remains a viable and successful method of instruction for many student learners, faculty should be encouraged to provide alternative approaches and to be cognizant of different students' learning styles. Students who are actively engaged in the learning process are more likely to become involved learners than those who remain passive receivers of information. Therefore, providing a variety of instructional approaches allows students to choose the method that complements their individual learning style. Learning laboratories, individualized instruction, computer assisted instruction, small group work, and simulations--all provide students with active, participatory learning experiences.

Technology has revolutionized the way faculty teach and students learn and will continue to do so as the twenty-first century progresses. There is a pressing need for technological equipment, particularly computers, in all areas of learning, but especially in mathematics. Just as computers and calculators have made paper and pencil procedures obsolete in the workplace, they have established and continue to change the ground rules for mathematics education. Graphing calculators enable students to visualize mathematical concepts in ways that were not possible before and help to promote student engagement in the learning process. Because the technology changes so rapidly, special efforts are needed to keep pace by faculty and students. Teachers are no longer able to teach as they were taught. New knowledge and new technologies necessitate that they become proficient users of and instructors in the new technological advances. As survey respondents have already indicated, technological equipment is an extremely high priority need. Out of forty-two responses from the various colleges, thirty-four (81 percent) indicated that their primary equipment needs were for more computers, computer networks, computer labs, and most importantly graphics calculators.

8. Recommendation. It is recommended that efforts be intensified to seek funding to be made available to community colleges for computer-related software and hardware for the enhancement of learning.

9. Recommendation. It is recommended that institutions establish as a priority the training and development of mathematics faculty in the use of new technologies.

Instructional standards. Approximately 80 percent of the respondents indicated that curricular standards and levels of difficulty in mathematics courses were largely determined by course content and division/department requirements. They also indicated that the whole of the curriculum moves much beyond the minimal CLAST competencies. Other influential determiners of rigor included instructor expectations and college requirements. Though mentioned less frequently, student ability at entry to a course was also a factor.

The Division of Community Colleges' report on the associate in arts degree (February 1991, p. 34) cited Postsecondary Education Planning Commission (PEPC) data and community college data on grade distribution. The report found that 48 percent of A.A. grades were above a C. PEPC's figures were considerably higher than that. Both reports support the finding that the distribution of grades remains problematic. The nature of the problem intensifies when students who receive As and Bs in college course work still have difficulties passing the CLAST exam. The issue of standards as it applies to grades students receive is one that needs to be carefully monitored by each institution and kept consistent with their own defined concepts of rigor.

Another indicator of standard control is class size. Proviso language in the 1992 General Appropriations Act stipulates "that colleges shall continue to the extent possible to reduce the class size of college level English and mathematics courses to an average of 22 students." Survey respondents indicated that mathematics classes frequently exceed that limit due to budget restrictions.

Several argued that the best means for improving the teaching/learning process would be through limiting class size.

10. Recommendation. In keeping with the provision in the 1992 General Appropriations Act, it is recommended that state funding be made available to maintain an average class size of 22 in mathematics classes.

Accommodating individual differences. Community colleges can justifiably be proud of their accomplishments in terms of addressing the individual needs of students. They are teaching institutions and are committed to student-centered philosophies. Many of the colleges have developed or are developing self-paced mathematics courses so that students can move through them at their own rate of speed, a commendable action. Students have ready access, for the most part, to learning labs where they can receive individual assistance from qualified instructors and/or peer tutors. Instructors confer with students during regularly scheduled faculty office hours. Student success and/or college survival courses are offered on several campuses. Counseling and advisement services are made available to students. Special testing and assessment services are available, not only for placement purposes, but also for determining special learning problems. Virtually all community colleges have offices for disabled student services where physically handicapped and learning disabled students can receive special help. Several respondents indicated, however, that faculty are not trained to work with disabled students which creates a problem for most campuses. A few colleges have hired faculty who are trained to work with students who have learning disabilities, but largely the issue has not been addressed in any

meaningful way. Just as physically disabled students have special needs, learning disabled students require special diagnostic and assessment procedures, ancillary services, faculty who are trained to work with learning disabilities, and special tutoring services. Since the numbers of these disabled students are expected to grow, the issue will continue to be problematic for the majority of the colleges unless it is addressed in a substantive way.

11. Recommendation. It is recommended that the State Board of Community Colleges develop and implement a plan that would create special funding strategies for disabled students in all programs available at community colleges.

Improving teaching and learning. Math professionals shared a wide variety of suggestions to improve the teaching and learning process. Most frequently mentioned was the need for more and better computer technology along with the necessary faculty training to effectively implement its use in classrooms and laboratories. Other high priority areas included smaller classes, better articulation with high schools to assure a better prepared student at college entry, improved placement testing, increased opportunities for faculty development, more emphasis on competency based learning through access to more labs, modularized courses at the college prep level, and maintaining high expectations for students. Some of the individual suggestions worthy of consideration are quoted below.

--Limit acceptance of students to ones that enter "above" the Pre-Algebra level.

--Adhere to prerequisites.

--Institute a higher minimum GPA for continued enrollment . . .

--More uniformity in course content [and] college prep offerings . . .

--We need to be more aware of students with learning disabilities so that we can make appropriate accommodations. Students' learning styles should be used for placement in the appropriate learning environment.

--More money for added support at the college prep level or require students to be able to enter at a college level.

The concerns about quality higher education are universal in educational circles and society in general. The demand for a more highly educated student is everywhere. To that end, increasing emphasis will need to be placed on teaching techniques and student learning styles. Bold initiatives may need to be taken by faculty to break the reliance on lectures as a primary means of dispersing knowledge. As the demands for accountability continue to gain momentum, more specific outcomes will be expected and will need to be documented. Fortunately, the Community College System in Florida is not without directives in that regard. The Master Plan and Accountability Plan both provide the framework for which mathematics divisions will want to evaluate themselves.

12. Recommendation. It is recommended that mathematics divisions/ departments use the Master Plan and the Accountability Plan as a means to place renewed emphasis on how to achieve and maintain quality standards with regard to curriculum, student performance, and faculty performance.

Academic support labs. Nearly all of the respondents stated that students enrolled in mathematics courses had access to academic support labs to reinforce concepts taught in class. Generally speaking, attendance at the labs was voluntary

for college level students but mandatory for college preparatory students. Often students are referred to the labs by instructors who have spotted deficiencies in a given student's performance. Unfortunately, according to some respondents, some students who really need the lab's services fail to seek it out. Others who do seek the services of the lab are sometimes frustrated because the lab is too small and does not have adequate numbers of faculty or other personnel to assist the students who want to be served. Overall, there was an awareness that these labs do provide a valuable service to students and to faculty by offering academic reinforcement using a variety of instructional approaches. It was readily apparent that there will be a continuing need for these labs and that additional resources will be necessary to fund them.

Faculty

Demographics. The following information is provided to indicate what the current demographic trends are for faculty in the discipline of mathematics. It should be noted that this information is not complete in that there were only 42 responses from a possible total of 55 campuses. Additionally, for those who did respond, some did not have data for part-time instructors, and some chose not to respond to the questions in this section either by choice or from oversight.

What these demographics reveal with regard to age of full-time faculty is that the majority of faculty members fall into the brackets of forty and above with almost 10 percent at the age of sixty and above. Using the total of 519 full-time instructors indicated in table 3 and assuming 10 percent of that number will be

eligible for retirement in the near future, community colleges should anticipate having to replace fifty-two instructors in mathematics alone. Table 4 addresses the educational level of full-time faculty. Percentages are indicative of high quality with almost 19 percent holding doctorates, over 28 percent holding an M.A. plus 30 additional hours, and 51 percent holding master's degrees. With regard to race and gender, table 5 indicates the faculty population in both full- and part-time mathematics positions is predominantly white. White males represent approximately 47 percent of the teaching population at the community college level in Florida while white females represent 40 percent. The remaining 13 percent are spread among the other races. Minority representation needs to be monitored and addressed in colleges where it falls below the average minority population of the area.

13. Recommendation. It is recommended that community colleges address the issue of minority representation in faculty ranks through active recruiting of minority candidates and through the use of minority candidate pools.

Table 3

Numbers and Percentages of Full- and Part-time Mathematics Faculty by Age Category

Full-time Faculty

Age	Number	Percent
20-29	42	8.1
30-39	93	17.9
40-49	193	37.2
50-59	141	27.2
60+	50	9.6
Total	519	100%

Part-time Faculty

Age	Number	Percent
20-29	71	10.9
30-39	219	33.6
40-49	206	31.6
50-59	100	15.3
60+	56	8.6
Total	652	100%

Table 4

Numbers and Percentages of Full- and Part-time Mathematics Faculty by Highest Degree

Full-time Faculty

Degree	Number	Percent
Doctorate	104	18.7
M.A. + 30	160	28.7
M.A.	284	51.0
BA/BS	9	1.6

Part-time Faculty

Degree	Number	Percent
Doctorate	34	4.7
M.A. +30	89	12.2
M.A.	411	56.5
BA/BS	194	26.6

Table 5

Numbers and Percentages of Full- and Part-time Mathematics Faculty by Race and Gender

	Full-time			Part-time		
	M	F	%	M	F	%
White	251	209	84.1	357	262	83.2
Black	22	22	8.0	29	21	6.7
Hispanic	15	14	5.3	30	14	5.9
Indian	3	0	0.5	5	1	0.8
Asian	5	3	1.5	11	10	2.8
Alien	3	0	0.5	2	2	0.5
Totals	299	248		434	310	
Percents	54.7	45.3		58.3	41.7	

Faculty development. Respondents stated that the most common forms of faculty development available to them were conferences, workshops and/or seminars, and college credit courses. Other forms of development, though less frequent, included self-selected projects, sabbaticals, and faculty exchanges. When asked what types of faculty development they would like to see offered, responses varied. Representative comments follow.

--FSU to offer a Ph.D. in math in Pensacola.

--Support of international connections (travel, faculty and student exchange possibilities).

--Demonstration lessons taught by teachers who have successfully used innovative techniques.

--Seminars by which the faculty can stay abreast of the integration of technology into the mathematics classroom.

The comments above represent a faculty "wish list" in addition to the traditional faculty development through workshops, seminars and course work. Several were very satisfied with the programs that already existed on their campuses while others would like more opportunity to travel to conferences and to exchange ideas with other faculty in the discipline. However, some expressed remorse about the loss of SPD funding due to budget cuts. Respondents indicated that the lack of faculty development funds and the inability to hire additional faculty resulted in a lowering of faculty morale. Opportunities for professional growth are essential to maintaining a vital faculty. Teaching too many classes that are too large can also deplete faculty energy and resourcefulness. For those reasons the following recommendation is made.

14. Recommendation. It is recommended that the hiring of additional faculty and faculty development remain high priorities for mathematics divisions.

New faculty. The twenty-eight community colleges appear, for the most part, to have solid programs in place to assist new faculty members. Only three respondents said no formal programs existed in their mathematics departments/divisions. However, informal interaction with tenured faculty seemed to suffice. The overwhelming majority had a combination of faculty mentoring or "buddy" programs and more structured orientation programs which provided faculty handbooks and numerous other kinds of information helpful to beginning instructors. Some programs were more formal in nature such as taking a course on the community college student while others involved more informal approaches such as visits with other faculty members or asking them questions.

Both appeared to bring about the desired results. Faculty chairs or department heads also make special efforts to meet individually with new faculty to acquaint them with policies, procedures, and to discuss the student population mix.

Students

Perhaps the most painful outcome of this study is the picture that emerges of the contemporary community college student. While any administrator or faculty member can give many examples of outstanding, successful students who have achieved despite hardships; the overall picture as perceived by survey respondents was bleak. Generally speaking, students are coming into the colleges underprepared academically and attitudinally. Only 52 percent of the respondents felt that students in entry-level mathematics classes had the necessary understanding to be successful. The remainder felt that students' entry-level skills were weak. In addition, an astounding 71 percent of faculty stated that students were attitudinally unprepared for the rigor of college studies.

When asked to list the major academic weaknesses students have at entry to mathematics courses, the following emerged.

> --The student population at this institution has generally poor mathematics background. Approximately 35% of the incoming students are placed in college preparatory math classes.
>
> --Inadequate basic skills in both arithmetic and algebra. Inability to transfer learning from subject to subject.
>
> --Entry placement scores are too low to assure that students who test into college level courses have adequate preparation for the course.
>
> --No algebra course prior to enrollment; stale skills and lack of arithmetic proficiency.

--Basic number skills, Study skills, Self-confidence, Critical thinking skills, Reading comprehension.

--1. Lack of good study skills 2. Lack of commitment 3. Lack of direction (goals) 4. Lack of success in mathematics 5. Lack of self confidence.

--They are weak in arithmetic and algebra skills. They are also weak in reading and writing skills. They are weak in geometry skills. Many students have poor study skills, and some lack sufficient time to study due to work and family responsibilities.. Many students lack problem solving ability, are unable to create even a simple math mode. Students suffer from test anxiety and an inability to concentrate during the entire class. Students are sometimes placed in a class without the prerequisite knowledge leaving them unprepared in general.

Several steps should be taken to overcome the problems with student performance and student attitude. First, colleges need to clearly define their standards and expectations for student performance and adhere to them. Firm policies and procedures should be in place so that students who are below standards in English, reading, and mathematics are not admitted to any college-level course until their basic mastery reaches a level where they are adequately prepared to comprehend the material. Second, those standards and expectations need to be communicated and articulated with middle school and high school students, parents, faculty, and administrators as has already been discussed in previous sections of this report. Third, orientation sessions and/or other specially scheduled programs with older adult students and all of the community college student body need to stress what is required academically and attitudinal for students to be successful. Student responsibility for his/her own learning should be stressed along with developing an awareness that sacrifices will have to be made. It may not be possible to be a full-time student with a full-time job and shoulder full-time family responsibilities. Students may need to be educated about making hard choices. Fourth,

faculty and other college leaders need to consistently demand quality performance and develop the critical thinking skills of students without totally sacrificing understanding and flexibility under extenuating circumstances. Administrators should also give serious thought to developing a policy defining what clearly indicates a reasonable and fair number of student attempts at completing a given course. Such a policy would alleviate the problem of students taking a given course numerous times without success. The time has come for institutions to declare that they will not endorse deficient standards. Acceptance of deficient standards will only add to the poor performance in mathematics that many students now display.

15. Recommendation. It is recommended that community colleges clearly define and establish limits on what would be a fair and reasonable number of repeat attempts by a student to be successful in a college credit course. If the student fails to meet the requirements as defined, appropriate counseling should be provided to direct the student to more suitable options.

16. Recommendation. It is recommended that no student be granted access to college-level courses until s/he demonstrates readiness through competency tests or successful completion of prerequisite courses.

Through the interview process, another issue emerged that needs to be recognized. Department chairs and faculty expressed concern about a rapidly changing student population. In addition to a growing mix of students in terms of age, race, and culture, students are more vocal and demanding about kinds of assignments given, the grades they receive, and what they expect from a course. There are growing numbers of students about whom faculty must be wary, i.e., those who are mentally or emotionally unstable. This mix of students and students' demands has increased faculty fears in working with some of them. All of this has increased the stress level under

which faculty must work and indicates that faculty may need to be cautious about sacrificing quality in order to pacify students.

Facilitating favorable student outcomes. To facilitate the adjustment of students to college, most respondents favored the development of effective orientation programs, student mentoring programs, required college survival courses for all students, strong advising/counseling processes that allow for one-on-one contact with students, and more faculty involvement in the advising process. Many advocated that articulation efforts should provide the framework for student access to college and the realization of expectations. One respondent stated:

> --I would like to continue the articulation process at area secondary schools and through other programs/groups that heighten awareness of student/parent responsibilities in study preparation and general survival college skills. While in college, mentoring groups would greatly help students in adjustment to the environment of the college.

For more efficient processing of students at entry to college, respondents indicated that telephone registration, computerized processing of information, more and better trained academic advisors, and continued efforts to increase the number of full-time qualified instructors would all be beneficial. What emerged as a salient point was the importance of accurate assessment through the placement test. Most faculty are dissatisfied with the cut scores, indicating that they are too low and that students are placed into classes where they cannot succeed. Others are wary of raising scores and would like to protect the student's right to try. Overall, however, there was wide agreement that the placement tests are faulty and more accuracy and consistency is needed with regard to initial assessment. The limitations and recommendations for

change regarding placement have already been treated in the section on assessment and will not be repeated here.

What emerged as pertinent to facilitating favorable student outcomes were several important concepts. First, was the need for more complete tracking and follow up of completers and leavers of courses and programs. Some clear-cut action has been taken with regard to that issue. The Division of Community Colleges has requested 1992 legislative support "to design and develop a system to enable the student data base to track individual students and targeted groups over an extended period of time at the program level being required by federal and state mandates" (It's a Brand New World (1992), p. 17). Should approval of the project be granted, funding would be available to the colleges for implementing academic audit and tracking systems. Second, was a need for relevant workshops with regard to teaching and learning to stimulate and update faculty on teaching techniques and improving relevancy in the classroom. Third, was the need to encourage students to accept full responsibility for their own learning. Fourth, was the desire for more support labs where students could receive special assistance. Finally, respondents indicated that smaller classes and having the resources to hire more faculty would benefit students.

Special students/special programs

The community college as an open access institution serves a very diverse student body. With this diversity comes special problems, challenges, and opportunities. Types of students who are increasing in numbers across the campuses in the state include English as a second language (ESL) students often referred to as non-native speakers or

limited English proficient (LEPs) students, learning disabled (LD) students, physically handicapped students, and academically disadvantaged students. These special students often face special barriers and problems that need to be overcome. In addition, faculty are often ill-equipped and ill-prepared to work effectively with these students. The quotations which follow help to define the parameters of the problem.

--Limited English is the major barrier.

--Some barriers faced by special populations are processing deficits, visual impairment, short-term memory impairment, long-term memory impairment, motor-skill impairment, physical and visual impairment. Others are lack of appropriate study skills, lack of study planning, lack of note-taking skills, lack of rea ¨ng facility.

--Low expectations from instructors. Some student populations may find the straight lecture approach difficult to learn from. They may need special tutors, notetakers, access to videotapes, Braille books, etc. They may need a more hands on, interactive approach to learning.

--Many students (academically disadvantaged, learning disabled) come to us without the necessary prerequisites. They face an almost insurmountable problem in achieving in a college math program.

--Large classes create a barrier to these student populations.

--Barriers include poor academic background, instructional methods which are too fast paced, instruction in a language which is not native to the student, and a physical environment not totally adapted to their needs. Students may arrive with unrealistic expectations, low intelligence, and artificially created attitudes. They will have trouble performing in college and too many dispensations will give the student a false sense of what lies ahead after college.

--The learning disabled are our biggest challenge today.

--Sometimes special groups of students are judged on their progress rather than on a set scale. We have students who may have progressed enough each year to warrant passing, but have not reached a level than enables them to be successful at the college level. We do not have the resources to provide the amount of individual help that these students need to be successful.

--Current course structure makes no provision for slower learners to take as long as they need to finish a course and not receive penalties (i.e. GPA reduction, financial aid probation/suspension). No training program exists to teach faculty how to deal with special student needs.

In spite of obvious difficulties, several kinds of valuable services are being offered to these special student populations. All schools have an Office of Handicapped Services or its equivalent where students with physical handicaps can receive special counseling, assistance in the form of note-takers and interpreters, special diagnostic assessment, and alternate testing arrangements for those who require it. Many campuses have an ESL program for non-native speakers of English, and most campuses have developed college-preparatory programs designed to fill in the learning gaps for many of these special students. In addition, learning labs where students can receive individualized instruction and reinforcement of competencies through a variety of self-paced methods and media are performing an invaluable service for these special students. Respondents indicated that such labs are well-integrated into the college. Special machinery and equipment are available for hearing and sight impaired to assist in reading and speaking. Many colleges also make effective use of student tutors and special mentoring programs for "at risk" students.

What this indicates is that an infrastructure is in place to meet special student needs. However, that infrastructure can only be as effective as resources allow it to be. Frequently, learning labs are understaffed and unable to fulfill all the demands placed upon them. The issue of faculty competence in working with special student populations is another area that needs to be addressed. The level of faculty comfort in working with these students may well have a direct impact on how well these students perform. In

summary, what appears to be the norm is that some of the needs of these special student populations are being met while others are not, and it is probably safe to assume that limited resources are a primary reason why some needs are left unmet.

17. Recommendation. It is recommended that institutions offer faculty development opportunities in working with learning disabled students and that special education consultants be hired full-time, part-time, or on a consultant basis to assist in the training.

Dual enrollment program. Dual enrollment, which allows colleges to offer college courses to high school students, is another special program provided for in law (Section 240.116, Florida Statutes). Community colleges in the state have endorsed this concept whereby qualified high school students can enroll in college-level courses while still in secondary school and thus earn college credits applicable to high school and college degrees. The data that follows reflect the dual enrollment status for academic year 1990-91, the most recent figures available at the writing of this report. Table 6, which indicates numbers of students and numbers of hours for which they enrolled, applies to mathematics courses only. Table 7, which involves numbers of courses and instructors, applies to dual enrollment in all disciplines since specific data on mathematics were not readily available.

Table 6

Numbers of Students and Credit Hours
Generated through Dual Enrollment
1990-91

No. of Mathematics Students Dually Enrolled	Sum of Credit Hours
4,966	17,009

Table 7

Dual Enrollment Courses/Students
Taught by High School/College Instructors
1990-91

No. of Courses Taught		No. of Students Taught	
By H.S. Inst.	By College Inst.	By H.S. Inst.	By College Inst.
(10.5%)	407 (89.5%)	2,648 (15.9%)	13,965 (84.1%)

Since a high percentage, 84.1 percent, of students are taking dual enrollment courses from college instructors, the faculty has a built-in opportunity to educate high school students about the demands and expectations of college-level work. As a cautionary measure regarding dual enrollment, colleges also need to remain vigilant in assessing and assuring that college-level courses being taught to high school students maintain the same standard of rigor as those courses taught to students enrolled on campus in order to retain the academic integrity of the program.

Multiculturalism

Since the issue of multiculturalism impacts several areas addressed in this report including curriculum, instruction, faculty, and students, it will be treated here as it applies to several facets of the educational setting. For the purposes of this review, multiculturalism shall refer to the awareness of and appreciation for people of different cultures. The ultimate aim of increased awareness and understanding is to promote the building of a diverse community of people who live in mutual harmony and friendship despite differences.

Mathematics professionals indicated that their subject matter is unique in that it is culturally universal. All nationalities and cultures must relate to it in the same logical, sequential manner. In addition to its universality, faculty try to select texts that reflect multicultural concerns and have designed a curriculum that they feel should adequately meet the needs of a diverse population. The following quotation illustrates the point.

> The mathematics division provides a wide spectrum of courses to meet the diversity of our student body. We offer low level remedial courses up to advanced differential equations. We offer two levels of College Algebra - one for the math/science calculus bound student, and one for the Liberal Arts student.

Other efforts have been made through special seminars, bringing in guest speakers, and discussing multicultural concerns at faculty meetings. More formal kinds of recognition are evidenced on campuses during Black History Month and Native American Month. While all of these activities are good in and of themselves, the danger is that they too can become very superficial and, perhaps, can even become a means of evading true interaction with people of other cultures.

Some smaller colleges with relatively fixed populations and small minority representation feel insulated from the larger society's cultural concerns and have felt little need to expand or challenge themselves and their student body to contemplate or grapple with issues of multiculturalism. As one respondent stated:

> We have done very little at this time to address the diversity issue. In our part of the state, ethnic diversity is not as big an issue as it is in other regions of the state, but it will become more important for us also.

Larger colleges in cosmopolitan areas of the state tended to be more involved with multicultural concerns due to the diversity of their student population.

However, the need for meaningful interaction has become more prevalent since the nation watched aghast when the Los Angeles riots took place recently. Clearly, a need for deeper understanding is on the agenda. Simply having a textbook that reflects other cultures may not be sufficient. On one level, faculty may discuss racial or cultural issues in a classroom, or students may take pride in being on an integrated campus. It is quite another level, however, to find activities on a campus that result in regular interaction with students from other cultures. This kind of meaningful interaction in a variety of settings would promote an atmosphere where students could grow in understanding of one another and gradually become comfortable with one another in spite of differences.

Faculty, by their own admission, often feel inadequate and ill-prepared to cope effectively with issues of diversity in their classrooms. Cultural bias is often not perceived as such by those who hold biased views. Consequently, faculty, staff, and students may all need sensitivity training to stimulate reexamination of long held views.

To that end, mathematics chairs and faculty should consciously promote staff development programs designed to assist them in addressing multicultural issues. They should also promote the hiring of more minority faculty along with regular and meaningful interaction among students of all cultures represented on their campuses thus helping to dispel students' feelings of discomfort.

18. Recommendation. Due to the growing diversity of the community college student population, it is recommended that mathematics chairs and faculty promote staff and student development programs that actively engage the participants in critical issue-oriented discussions/activities centered around multicultural concerns.

Division of Community Colleges

Survey respondents were asked to indicate how the Division of Community Colleges might help them to achieve their educational goals. Of the thirty-one who responded to the question, 54.8 percent felt the primary purpose of the Division should be to advocate appropriate funding for the community college system. Of particular concern was securing enough funding to hire additional full-time faculty. Another segment felt the Division should promote statewide curricular goals by encouraging consistency across the state, especially with regard to general education courses and CLAST competencies. Others suggested that the Division should support the equipment needs of the community colleges especially as they relate to computerized instruction and the growing demand for graphics calculators in mathematics courses. Some representative quotations from the survey respondents follow.

> --Do a better job of monitoring and enforcing compliance with the Gordon Rule (minimum class size) and common course numbering system--prerequisites, content, sequence.

--Continue to support appropriations for scientific and technical equipment. Seek funds to implement CLAST enhancement plans. Leadership in student follow-up efforts by moving to colleges providing social security numbers of students who have taken General Education courses e.g. math & tracking meaningful cohorts. Such data is the only information useful in curriculum reform. This approach is consistent with the current direction of the accountability committees at the state level.

--Strong and forceful lobbying at the state level.

--Make math graduate courses more accessible to community college faculty.

--Help achieve adequate funding for state community colleges. Make us aware of innovative things going on at other community colleges. Raise the cut off score on ACT to get into MAT 1033. Currently many students entering this course are much too weak. Encourage schools to have course content more closely in line with the State Common Course Numbering System course descriptions. Work out a system so that school districts are on-line with community colleges so that student high school transcripts are available on-line at the time students register at the community colleges. Require school districts to use student social security numbers so that the SS# system of student identification is used at all levels.

--Lobby to fully fund College-Prep instruction. Lobby to limit entrance of students to Elementary Algebra level or higher.

--By informing community colleges of the results or research conducted in the different areas.

Overall, the respondents view the Division's responsibilities as advocating sufficient funding for community colleges, providing leadership on educational issues through appropriate workshops/conferences, and communicating in a timely manner the results of research to the colleges.

SUMMARY AND CONCLUSIONS

The purpose of this summative review was to examine the community college mathematics program statewide from an issue- and policy-oriented perspective. It also sought to discover and describe what emerged as areas of strength and areas of concern among the professionals working in the mathematics divisions. Information was gathered through questionnaires and interviews with various mathematics chairs and faculty throughout the state.

The following areas of concern became evident as the review process progressed. A major concern was the lack of student preparedness for the demands and expectations of college-level work. According to faculty perceptions, a large proportion of students, over 50 percent of them, are not ready academically and a much higher percentage are not prepared attitudinally for the demands of college life. This lack of readiness has created an increasing need for college preparatory courses in mathematics. As the number of students and courses in college preparatory programs grows, so does the anxiety among faculty members. The underlying fear is that the community colleges may become in fact college preparatory mills. As one interviewee expressed it, "Can you have a college without college students?" That question is one that gets at the heart of the open door policy, and it is one with which policy makers at the state and institutional level will have to struggle. How far can open access policies stretch? Are we being fair

to students by allowing them in with academic credentials well below college level? Can we justify allowing students to repeat courses numerous times?

Another concern was the growing inability to effectively meet the needs of learning disabled (LD) students and English as a Second Language (ESL) students, both of whose numbers are increasing. There was growing concern that due to budget cuts at the university level, the statewide articulation agreement may be in jeopardy. There was statewide concern about the current placement test with many stating that the cut scores are too low. Chairs and faculty members favored the idea of a common statewide placement test, a project that is currently underway at the DOE. Faculty also expressed concern about the numbers of adjunct faculty teaching courses. Percentages in some areas ran as high as 50-75 percent. A final concern, forcefully expressed by some faculty, was the need for increasingly sophisticated computer technology and the necessary faculty training to use it effectively in the classroom.

These areas of concern do not, however, obliterate the numerous strengths of the mathematics program. Overall, the mathematics divisions/departments are doing an exceptionally fine job of providing quality teaching and learning experiences for community college students. Faculty are dedicated, resourceful, flexible, and reasonably patient during this period of economic cut-backs. They are providing students with a sound curriculum and are to be especially commended for the innovative ways in which they are attempting to provide alternative approaches to learning for the diverse population they serve. In place at most institutions are academic support laboratories where students can receive assistance with any level of mathematics; self-paced courses;

video reinforcement for classes plus televised courses; computerized instruction; tutoring and mentoring programs; special courses in college survival and CLAST/CLASP competencies; orientation programs; and special assessment and counseling from both counselors and faculty members. It appears that every avenue for accommodating student need has been explored and that programs are in place for the majority of them. For those accomplishments, the mathematics divisions/departments system-wide are to be congratulated.

REFERENCES

Associate in arts degree program. (February 1991). Program Review Report. Florida State Board of Community Colleges.

Cohen, A. M., and Associates. (1975). College responses to community demands: The community college in challenging times. San Francisco: Jossey Bass.

Counting on you: Actions supporting mathematics teaching standards. (1991). Mathematical Sciences Education Board. National Research Council. Washington, D.C.: National Academy Press.

Deegan, W. L., Tillery, D., and Associates. (1985). Renewing the American community college. San Francisco: Jossey Bass.

Fleishman, S. S. (1991). Manifestations of involvement in learning for re-entry women. (Doctoral dissertation, Florida State University, 1991). Dissertation Abstracts International, 52, 03A, 779.

Lincoln, Y. S. & Guba, E. G. (1985). Naturalistic inquiry. Beverly Hills, CA: Sage Publications.

Mercer, J. (1992). States turn to community colleges as route to bachelor's as 4-year campuses face tight budgets and overcrowding. The Chronicle of Higher Education, 38, 35, A1 +.

Patton, M. Q. (1980). Qualitative evaluation methods. Beverly Hills, CA: Sage Publications.

Student access to higher education (Report No. 1). (1991). Report and recommendation of the Postsecondary Education Planning Commission. Tallahassee.

It's a brand new world. (1992). A Legislative Program for Florida's Community Colleges.

APPENDIXES

APPENDIX 1

RECOMMENDATIONS

1. Recommendation. It is recommended that a task force comprised of community college and Division representatives meet to develop policy guidelines with regard to access and student readiness for college.

2. Recommendation. It is recommended that student financial aid budget requests continue for financially needy students and that community colleges continue to search for alternative sources for scholarship/grant money, i.e., foundations and private donors, thereby helping to lift financial barriers for needy students.

3. Recommendation. It is recommended that the Grade Ten Assessment Test (GTAT) be used as an early warning signal to stimulate college-bound students to accomplish the levels of competency required for college entrance mathematics while they are still in high school.

4. Recommendation. Until such time as the common placement test is implemented statewide, it is recommended that institutions exercise their option to raise cut scores on the current mathematics placement tests in use to a level they feel is more appropriate for success in college algebra.

5. Recommendation. It is recommended that administrators and faculty alike implement and follow the May 1991 guidelines of the Ad Hoc Committee on Articulation which advocated increased interaction between and among public schools, area vocational centers, community colleges and upper division colleges.

6. Recommendation. In support of the SBCC's recommendation that high school students who are college bound be required to take college preparatory courses, it is recommended that community colleges assume a pro-active role in relaying that information to parents, students, administrators, and faculty at both middle school and high school levels.

7. Recommendation. It is recommended that MAT 1033 be uniformly reclassified as college preparatory instruction.

8. Recommendation. It is recommended that efforts be intensified to seek funding to be made available to community colleges for computer-related software and hardware for the enhancement of learning.

9. Recommendation. It is recommended that institutions establish as a priority the training and development of mathematics faculty in the use of new technologies.

10. Recommendation. In keeping with the provision in the 1992 General Appropriations Act, it is recommended that state funding be made available to maintain an average class size of 22 in mathematics classes.

11. Recommendation. It is recommended that the State Board of Community Colleges develop and implement a plan that would create special funding strategies for disabled students in all programs available at community colleges.

12. Recommendation. It is recommended that mathematics divisions/ departments use the Master Plan and the Accountability Plan as a means to place renewed emphasis on how to achieve and maintain quality standards with regard to curriculum, student performance, and faculty performance.

13. Recommendation. It is recommended that community colleges address the issue of minority representation in faculty ranks through active recruiting of minority candidates and through the use of minority candidate pools.

14. Recommendation. It is recommended that the hiring of additional faculty and faculty development remain high priorities for mathematics divisions.

15. Recommendation. It is recommended that community colleges clearly define and establish limits on what would be a fair and reasonable number of repeat attempts by a student to be successful in a college credit course. If the student fails to meet the requirements as defined, appropriate counseling should be provided to direct the student to more suitable options.

16. Recommendation. It is recommended that no student be granted access to college-level courses until s/he demonstrates readiness through competency tests or successful completion of prerequisite courses.

17. Recommendation. It is recommended that institutions offer faculty development opportunities in working with learning disabled students and that special education consultants be hired full-time, part-time, or on a consultant basis to assist in the training.

18. Recommendation. Due to the growing diversity of the community college student population, it is recommended that mathematics chairs and faculty promote staff and student development programs that actively engage the participants in critical issue-oriented discussions/activities centered around multicultural concerns.

APPENDIX 2

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APPENDIX 3

FLORIDA DIVISION OF COMMUNITY COLLEGES
MATHEMATICS PROGRAM REVIEW QUESTIONNAIRE

NOTE: This review shall be inclusive of all mathematics courses offered in the curriculum. If more space is needed to respond to any item, please attach additional pages.

Access

1. To what degree do students gain access to the required courses when they need them?
   ____ always ____ usually ____ seldom ____ never

2. Are any mathematics courses currently subject to enrollment limits due to student demand? If so, list the course numbers and names.

   _____
   _____

3. What, if anything, would help to facilitate student access to mathematics courses?

   _____
   _____
   _____

Assessment

4. What kinds of assessment are used when students enter individual mathematics courses?
   ____ diagnostic test ____ oral assessment ____ none ____ other ____

   _____

5. Aside from the normal tests, written papers, classroom contributions, and mid-term warnings, are any other assessment procedures used either while the student moves through or exits from mathematics courses?

   _____
   _____
   _____

6. What procedures are followed if assessments instruments misplace a student in a given mathematics course?

   _____
   _____
   _____

7. Does the mathematics subtest on CLAST assess all of the competencies covered in general education mathematics courses?
____ yes ____ no If no, explain why. _____

8. Are any assessment procedures used for longitudinal follow-up of mathematics students? [For example, is there any tracking of performance of college preparatory students? Are there any indicators of how well A.A. degree students perform at the university level or A.S. degree students at the employment level?]

9. What other outcomes assessment is being done in your division/department in addition to CLAST?

10. What additional assessment procedures might provide a more comprehensive view of student performance?

Articulation

11. Do you meet on a regular basis (a minimum of annually) with high school faculty in your subject matter area? yes ____ no ____ With area vocational center faculty? ____ yes no ____ With upper division college faculty? yes ____ no ____

12. In what ways have the meetings benefitted students as they progress from one educational level to another?

13. What other suggestions can be made to facilitate interaction among high school, vocational center, community college, and upper division faculty in your subject matter area?

Curriculum

14. How has the Gordon Rule influenced the shape and direction of the mathematics curriculum?

15. Are all of the CLAST competencies for mathematics covered in the general education mathematics courses? ____ yes ____ no

16. What other opportunities do students have to learn the skills needed?

17. Name any courses added to the mathematics curriculum this academic year.

18. Name any courses deleted from the mathematics curriculum this academic year.

19. What are the greatest strengths of the existing mathematics course offerings?

20. What additional course offerings, new materials, or technologies would enrich the mathematics curriculum?

21. How is curriculum content for a given course generally determined? (Check any that apply.)

____ by the instructor
____ by the textbook
____ through a syllabus
____ through collaborative efforts of faculty
____ other _____

22. What innovative approaches have been used to help students to see the relevancy of mathematics in their lives?

_____
_____
_____
_____

23. Does the current curriculum reflect a multicultural and pluralistic society?
____ yes ____ no What recommendations do you have regarding this issue?

_____
_____
_____
_____

24. Are materials screened for implications regarding sex role stereotypes and/or cultural and ethnic bias? ____ yes ____ no

25. How does the mathematics curriculum help carry out the mission of the college?

_____
_____
_____
_____

Instruction

26. What methods of instruction are used most frequently in your mathematics courses?

____ lecture
____ lecture/discussion
____ laboratory
____ televised instruction
____ learning laboratory independent study
____ non-laboratory independent study
____ group projects
____ other _____

27. What factors determine the standards of difficulty for the mathematics courses offered in your division?

____ student ability at entry
____ college requirements
____ division/department requirements
____ instructor's expectations
____ course content
____ other _____

28. What methods/procedures are used to accommodate individual differences/needs/learning styles?

_____
_____
_____
_____

29. What ideas do you have for improving the teaching/learning process?

_____
_____
_____
_____

30. Is there a need in you division/department for equipment of specialized materials? If so, describe.

_____
_____
_____
_____

31. (A) Do all mathematics students have access to an academic support laboratory? ____ yes ____ no (B) Do they use the lab for additional help? ____ yes ____ no (C) Is attendance at the lab mandatory for your students? ____ yes ____ no

Faculty

32. Indicate the number of full-time and part-time faculty in your division/department who fall into the following age categories:

FULL-TIME	____ 20-29	____ 30-39	____ 40-49	____ 50-59	____ 60 +
PART-TIME	____ 20-29	____ 30-39	____ 40-49	____ 50-59	____ 60 +

33. Indicate the numbers of full-time and part-time faculty in your division by highest degree held.

FULL-TIME	____ Doctorate	____ M.A. + 30	____ M.A.	____ B.A./B.S.
PART-TIME	____ Doctorate	____ M.A. + 30	____ M.A.	____ B.A./B.S.

34. Indicate the number of full-time and part-time faculty by race and gender.

	FULL-TIME FACULTY		PART-TIME FACULTY	
	Males	Females	Males	Females
White (Non-Hispanic)	_____	_____	_____	_____
Black (Non-Hispanic)	_____	_____	_____	_____
Hispanic	_____	_____	_____	_____
Indian	_____	_____	_____	_____
Asian	_____	_____	_____	_____
Nonresident alien	_____	_____	_____	_____
TOTALS	_____	_____	_____	_____

35. What types of faculty development opportunities are available for instructional staff in your division/department?

____ workshops/seminars
____ conferences
____ college credit courses
____ other _____
____ self-selected projects
____ sabbaticals
____ assigned research

36. How would you rank the quality of such development opportunities?

____ excellent ____ good ____ average ____ fair ____ poor

37. What additional kinds of faculty development would you like to have offered in your division/department?

_____
_____

38. What advice would you give a new faculty member about the current student body population in other that he/she might more effectively teach them?

_____
_____
_____
_____

39. By what methods has the letters department/division addressed the growing diversity of the student population?

_____
_____
_____
_____

40. What steps might faculty in your division/department take to emphasize teaching and learning in the classroom?

_____
_____
_____

41. What issues or concerns currently preoccupy faculty with regard to their profession?

_____

_____

_____

Students

42. Do students have the necessary entry-level mathematical skills to be successful in the courses in which they are enrolled? ____ yes ____ no

43. List the major academic weaknesses students have at entry to mathematics courses.

_____

_____

42. Are students attitudinally prepared for the rigor of college studies? ____ yes ____ no

43. What appear to be the major academic concerns of the students enrolled in courses within your division/department?

_____

_____

_____

44. In general, what ideas do you have regarding the following items:
(a) facilitating the adjustment of students to college

_____

_____

(b) facilitating the processing of students

_____

_____

(c) facilitating favorable student outcomes

_____

_____

Special Students/Special Programs

45. What changes and/or improvements would you like to see in working with special student populations, i.e. academically disadvantaged, minorities, limited English speakers, learning disabled, and physically handicapped students.

_____

_____

_____

_____

46. What kinds of special programs or targeted assistance are available for these students?

47. What role do academic support laboratories, college preparatory programs, and other alternative methods of instruction play in helping students to be successful in the community college setting?

48. How can the Division of Community Colleges best assist you in meeting your educational goals or help in addressing any of the issues targeted in this survey?

Send questionnaire responses by **March 15, 1992,** to:

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SC 278-0555

APPENDIX 4

CLAST Mean Scores and Pass Rates

Test Date	Math		Reading		Eng Lang Skills		Essay		All Subtests
	Mean	Pass Rate	Mean	Pass Rate	Mean	Pass Rate	Mean	Pass Rate	Pass Rate
All First-Time Examinees									
Oct 1990	306	79%	313	75%	318	77%	4.8	91%	57%
Feb 1991	305	76	310	74	315	75	4.9	92	54
Jun 1991	304	78	307	67	313	75	4.9	92	52
Oct 1991	307	78*	312	75	319	78	7.3**	92	56
Feb 1992	306	74	310	74	313	74	7.1	92	51
Jun 1992	306	75	309	70	314	77	7.3	92	53
Black First-Time Examinees									
Oct 1990	283	45%	289	38%	296	49%	4.0	74%	21%
Feb 1991	283	43	291	42	296	52	4.1	78	22
Jun 1991	281	46	283	32	292	46	4.0	75	19
Oct 1991	289	49*	291	40	299	54	6.1**	78	22
Feb 1992	286	44	292	44	295	49	6.1	79	22
Jun 1992	287	45	289	40	295	50	6.2	83	22
Hispanic First-Time Examinees									
Oct 1990	298	68%	305	65%	306	63%	4.4	84%	40%
Feb 1991	296	63	302	62	304	61	4.4	84	36
Jun 1991	296	69	294	49	300	59	4.5	84	33
Oct 1991	302	70*	305	64	307	65	6.7**	85	42
Feb 1992	299	66	302	62	303	60	6.5	86	36
Jun 1992	301	68	298	52	303	62	6.7	86	35

* The mathematics minimum standard changed from a scale score of 285 to 290.

** The essay grading scale changed from a four-point scale to a six-point scale.

CLAST Cumulative Pass Rates
October 1989 Cohort Through Nine Administrations
Community College and University

Test Date	Math	Reading	Eng Lang Skills	Essay	All Subtests
October 1989	80.8%	85.9%	80.2%	91.0%	65.2%
March 1990	85.8	90.4	85.7	93.9	75.3
June 1990	87.9	91.5	88.2	94.8	79.3
October 1990	89.8	92.5	90.1	95.6	82.6
February 1991	90.6	93.3	91.3	96.0	84.5
June 1991	91.3	93.6	92.1	96.4	85.8
October 1991	92.0	94.1	92.7	96.6	87.0
February 1992	92.4	94.6	93.2	97.0	88.0
June 1992	92.7	94.8	93.5	97.1	88.6

ASSOCIATE IN ARTS GRADUATES
PERFORMANCE IN SUS
1990 1991 (SUMMER, FALL, WINTER)
CCPRA098

DIVISION OF COMMUNITY COLLEGES
PROGRAM REVIEW
LEVEL I DATA DISPLAY

COMMUNITY COLLEGE ALL
UNIVERSITY ALL PAGE NO 1
DATE PREPARED 07/14/92
TIME 09.57.33 CCPSS PRC01

DISCIPLINE	UNDUPLICATED UPPER DIVISION HEADCOUNT		MEAN CUMULATIVE GPA		% 3.0 & ABOVE		% BELOW 2.0		% SUSPENDED		% GRADUATED		AVG SSH PER TERM		AVG TOT SSH TO DEGREE	
GROUPINGS	CC-AA	NATIVE	CC-AA	NATIVE	CC-AA	NATIVE	CC	AA	NATIVE	CC-AA	NATIVE	CC	AA	NATIVE	CC-AA	NATIVE	CC-AA	NATIVE
MATHEMATICS	215	231	2 73	2 90	40 0	47 0	19 0	4.0		5 0	1 0	15 0	20 0		8 2	10 1	143 3	133 4
FLAGS					•		x	•		x		x						
MATH SCIENCES	5	1	2 37	3 02	0 0	100 0	40.0	0.0		0 0	0 0	40 0	0.0		3 6	12.0	138 1	0 0
FLAGS			•		x	•	x	•				•						
STATISTICS	39	41	2 60	2 85	15 0	41 0	21 0	7 0		8 0	2 0	13 0	22 0		9 2	10 9	139 2	126 6
FLAGS					x	•	x	•		x	•	x	•					
MATH - OTHER	1	0	3 00	0 00	100 0	0.0	0 0	0 0		0 0	0 0	0 0	0 0		3 0	0.0	0 0	0 0
FLAGS			•		•							x						
TOTALS	260	273	2 70	2 89	35 7	46 3	19 6	4 4		5 3	1 1	15 1	20 2		8.3	10.3	142 6	132 4

x GROUP A INDICATOR FLAGS 10
• GROUP B INDICATOR FLAGS 12

CC-AA - AN UPPER DIVISION STUDENT IN AN SUS INSTITUTION WHO GRADUATED WITH AN ASSOCIATE IN ARTS DEGREE FROM A FLORIDA COMMUNITY COLLEGE, ENTERED THE SUS INSTITUTION AND REMAINED IN THE SAME SUS INSTITUTION

CC AS - AN UPPER DIVISION STUDENT IN AN SUS INSTITUTION WHO GRADUATED WITH AN ASSOCIATE IN SCIENCEDEGREE FROM A FLORIDA COMMUNITY COLLEGE, ENTERED THE SUS INSTITUTION AND REMAINED IN THE SAME SUS INSTITUTION

NATIVE - AN UPPER DIVISION STUDENT IN AN SUS INSTITUTION WHO BEGAN THE BACCALAUREATE PROGRAM IN THE SUS INSTITUTION AND REMAINED IN THE SAME SUS INSTITUTION

OTHER - AN UPPER DIVISION STUDENT IN AN SUS INSTITUTION WHO IS OTHER THAN CC-AA, CC AS, OR NATIVE

APPENDIX 6

SELECTED BIBLIOGRAPHY

A challenge of numbers: People in the mathematical sciences. (1990). Mathematical Education Board. National Research Council. Washington, D.C.: National Academy Press.

Counting on you: Actions supporting mathematics teaching standards. (1991). Mathematical Sciences Education Board. National Research Council. Washington, D.C.: National Academy Press.

Everybody counts: A report to the nation on the future of mathematics education. (1989). Mathematical Sciences Education Board. National Research Council. Washington, D.C.: National Academy Press.

Koltai, L. and Wilding, M. (1991). The status of science engineering, and mathematics education in community, technical, and junior colleges. Washington, D.C.: American Association of Community Colleges.

Leitzel, J. (Ed.). (1991). A call for change: recommendations for the mathematical preparation of teachers of mathematics. Mathematical Association of America. (ISBN 0-88385-072-9).

Moving beyond myths: Revitalizing undergraduate mathematics. (1991). Mathematical Sciences Education Board. National Research Council. Washington, D.C.: National Academy Press.

Opportunities in the mathematical sciences. (1992). National Science Foundation. Washington, D.C. 20550.

Professional standards for teaching mathematics. (1991). National Council of Teachers of Mathematics. (ISBN 0-87353-307-0).