ED 274 399   JC 860 521

AUTHOR   Sworder, Steve
TITLE   Determination of the Core Curriculum for the Liberal
                Arts Mathematics Course at Saddleback College.
PUB DATE   Oct 86
NOTE   61p.; Ed.D. Practicum, Nova University.
PUB TYPE   Reports - Research/Technical (143) --
                Dissertations/Theses - Practicum Papers (043)

EDRS PRICE   MF01/PC03 Plus Postage.
DESCRIPTORS   *College Mathematics; Community Colleges; *Course
                Content; Course Objectives; *Liberal Arts;
                Mathematics Curriculum; *Mathematics Education;
                Questionnaires; School Surveys; *Student Attitudes;
                *Teacher Attitudes; Two Year Colleges
IDENTIFIERS   *Saddleback College CA

ABSTRACT
                A study was conducted to assess faculty and student
preferences regarding the goals and content of Saddleback College's
(California) liberal arts mathematics course. Following a review of
the literature, an extensive list of course goals, content areas, and
prior student preparation needs was formed into a questionnaire,
which was administered to 12 full-time mathematics faculty, 52
full-time liberal and fine arts faculty, 25 part-time mathematics
faculty, and a sample of 93 liberal arts and fine arts students.
Study findings, based on responses from 12 full-time and 23 part-time
mathematics teachers, 25 liberal/fine arts faculty, and 65 students,
included the following: (1) each group, except the full-time
mathematics faculty, agreed that course goals should include the
student's learning basic problem-solving steps that could be applied
to any career field; (2) all groups felt students should complete
some mathematics prior to enrolling in the liberal arts mathematics
class, with all faculty groups indicating that arithmetic and
beginning algebra should be part of students' prior experience; and
(3) the following topics were supported by all groups for inclusion
in the class: the fundamentals of mathematical reasoning and logic,
functions and graphs, probability and "odds," recent developments and
discoveries in mathematics, computer technology, statistics, and
methods of organization using sets. The study report includes a
bibliography of general references and textbooks available for the
course, along with the survey instruments. (LAL)

DETERMINATION OF THE CORE CURRICULUM
FOR THE LIBERAL ARTS MATHEMATICS
COURSE AT SADDLEBACK COLLEGE

by

Steve Sworder, M.A.T.

Saddleback College

A Practicum presented to Nova University in partial
fulfillment of the requirements for the
degree of Doctor of Education

Nova University

October 1986

ABSTRACT

The purpose of this study was to identify the core curriculum for the liberal arts mathematics course at Saddleback College. The appropriateness of existing course goals and content were brought into question in view of recent conflicting recommendations in the mathematics education literature. Following a review of the literature, an extensive list of potential course goals, content, and prior student preparation was formed into a questionnaire. This questionnaire was given to the full-time mathematics faculty, full-time liberal arts and fine arts faculty, part-time mathematics faculty, and a sample of liberal arts and fine arts students. The mean response for each group was calculated for each questionnaire item. The responses from the latter three groups were composed into a single list of preferred topics in preparation for the curriculum review process by the full-time mathematics faculty.

The preferred course goal was for the student to learn the basic problem solving steps that can be applied to any career field. A review of computational skills in the areas of arithmetic, beginning algebra, and beginning geometry was a goal agreed to by all three groups. The faculty groups supported a placement test for entry into this class, but the students did not form an opinion in this area. Those topics desired by at least two of the three groups included the fundamentals of mathematical reasoning, measurement and the metric system, probability, statistics, functions and graphs.

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It was recommended that these topics form the core of the curriculum for the liberal arts mathematics class. It was also recommended that entry into the class be restricted to those who have completed courses in arithmetic and beginning algebra and who have successfully completed a placement test covering arithmetic operations and concepts.

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Chapter 1

INTRODUCTION

Nature of the Problem

The mathematics education literature has made conflicting

recommendations concerning the objectives and content of the course

commonly referred to as "liberal arts mathematics." The Mathematics

Association of America desires this to be a "mathematics appreciation"

class that allows students to understand the historical and contemporary

role of mathematics and avoids the teaching of high school mathematics

skills (CUPM,1983:45). Contrary to this view, the participants in the

conference entitled New Directions in Two-Year College Mathematics

resolved that the contents of mathematics courses in two-year colleges

should be of immediate use to students. It was felt that the liberal

arts mathematics course should include basic mathematical competencies

and new technologies (Albers, 1985:373). Because there is no external

agency that mediates opposing views in mathematics education and

produces course curriculum acceptable to and followed by all colleges,

each college must engage in this activity individually. Only in this

way can curricular reform result in mathematics courses sufficiently

broad and concentrated to satisfy the peculiarities of each institution

(Cohen, 1985:59). There were others in the College community besides

the full-time mathematics faculty who had an interest in the liberal

arts curriculum in general and the liberal arts mathematics course in

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particular. Their views were needed to insure the development of a satisfactory liberal arts mathematics course at Saddleback College.

Purpose of the Study

It was che purpose of this study to determine the contents of the core curriculum for the liberals arts mathematics class desired by the liberal arts and fine arts faculty, those students most likely to take this course, and those faculty most likely to teach it.

Method of Investigation

A questionnaire was developed that encompassed course objectives, prerequisites, and content. This questionnaire was used as the measurement instrument in the opinion survey of the full-time and part-time mathematics faculty, the full-time liberal arts and fine arts faculty, and a sample of students majoring in the liberal or fine arts or whose major was undecided. The mean response to each questionnaire item from each of these groups was calculated. Using the mean response values from the part-time mathematics faculty, the liberal arts and fine arts faculty, and the student sample, the preferred course objectives, prerequisites, and content were identified.

Chapter 2

BACKGROUND AND SIGNIFICANCE

Review of the Literature

In 1977 the Committee on the Undergraduate Program in Mathematics

(CUPM) of the Mathematical Association of America established the CUPM

Panel on Mathematics Appreciation Courses. The Panel began a six year

study of the contents of those college and university courses that

treated mathematics appreciation for students in the arts and humanities.

The final report from this study was presented in 1983 (CUPM, 1983).

The Panel concluded that the ultimate goal of liberal arts mathematics

courses is to instill in the student an appreciation of mathematics.

For this to occur the Panel (CUPM, 1983:45) believes that

> students must come to understand the historical and contemporary
> role of mathematics, and to place the discipline properly in
> the context of other human intellectual achievements.

Fundamental to the understanding of the development and role of mathe-

matics by students is the need to impart the "idea of mathematics as

art" (CUPM, 1983:46). The Panel (CUPM, 1983:46-47) recommends that the

following areas be stressed in these courses:

1. The relationship between mathematics and our cultural heritage.
2. The role of mathematics in history and the role of history in mathematics.
3. The nature of contemporary mathematics.
4. The recent emergence of several mathematical sciences.
5. The necessity of doing mathematics to learn mathematics.
6. The role of mathematics as a tool for problem solving.
7. The verbalization and reasoning necessary to understand symbolism.
8. The existence of a large body of interesting writing about mathematics.

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In addition to the recommended inclusion of these topics, the Panel

gives several recommendations for topics, activities, and procedures

to be avoided in these courses. The Panel (CUPM, 1983:50) feels that

"in-course remediation should be avoided." The teaching of high school

mathematics skills should not be part of a liberal arts mathematics

course (CUPM, 1983:45). The Panel (CUPM, 1983:51) believes

> it can not be over-emphasized that a mathematics appreciation
> course can not fulfill its goal if it degenerates into the
> teaching of arithmetic computations or pre-algebra skills, or
> if it is limited to a topic such as "consumer mathematics."

Karl Smith (1984) speaking before the Arthur P. Sloan

Foundation sponsored conference entitled New Directions in Two-Year

College Mathematics presented a contrasting view of the goals and

content of liberal arts mathematics courses. Smith is a professor of

mathematics at Santa Rosa Junior College (California), the co-author of

three mathematics textbooks, the sole author of eight mathematics text-

books including a liberal arts mathematics book in its fifth edition,

and President-elect of the American Mathematical Association of Two-

Year Colleges. Smith (1984:4) believes that liberal arts mathematics

courses aimed at "developing an appreciation of mathematics" and built

around the great ideas that revolutionized modern thinking and the

mathematical sciences should not be retained unchanged in the community

college curriculum. Such mathematics courses fit well into the junior

college curriculum of the early 1920's when the liberal arts accounted

for three-fourths of the entire college curriculum (Smith, 1984:3).

Cohen and Brawer (1982:286) found that the liberal arts ld on to this

proportion of the community college curriculum well into the 1960's.

With the rising student activism of the 1960's came the call for

relevance and relevance was interpreted as providing job skills (Cohen

and Brawer, 1983:295). Consumerism characterized the 1970's. Students, as customers, dictated the terms under which they would study, what they would study, and what they expected to obtain from their efforts. This occupational emphasis struck at the very corner stones of the liberal arts as the teaching of values and common heritage lost support among both students and faculty (Cohen and Brawer, 1983:295). These forces took a heavy toll on the enrollment in liberal arts mathematics courses. Nationally the enrollment dropped 74 percent between 1975 and 1980 (Smith, 1984:5). Cohen and Brawer (1982:304) concluded that for any aspect of the collegiate function to remain in the community college curriculum, it must fit into the "career, compensatory, and community education programs" as well as the liberal arts classes that require literacy. Smith (1984:7) supports this analysis in his call for a reorientation of the liberal arts mathematics course. He feels it should serve those who are looking for "basic skill-building mathematics courses." He believes this course should cover arithmetic, algebra, geometry and topics from logic, probability, statistics, and computer technology. Such a course, he believes, would meet the basic skills competency requirements of the 1980's as well as the job oriented demands of today's and tomorrow's students (Smith, 1984:11).

Cornutt (1984) reviewed the mathematics courses taken at community colleges by students who sought transfer to a four year college or university. He feels all bachelor's degree aspirants should complete a course in intermediate algebra. Beyond that he believes that even students whose major field held no obvious applications of mathematics should be exposed to some college level material in mathematics. Although the mathematics appreciation courses were the logical

alternative for these students, he thinks that such courses often
underestimate their audiences by concentrating on mathematical fun-and-
games or consumer mathematics. Cornutt (1984:5) believes "the real
heart of mathematics appreciation courses should be a few grabber ideas,
preferably in the form of applications/problems, around which two-week
units could be built."

Sons (1976) described the revision of the terminal one semester
mathematics course at Northern Illinois University taken by students
whose program required no other mathematics. Traditional mathematical
systems, computers in society and statistics from a consumer's viewpoint
were the topics each given one-third of the semester. The goals of the
course were to expose the students to mathematical thinking, to develop
an awareness in the student of the nature and power of some elementary
mathematical ideas, and to develop the student's mathematical skills and
competencies by means of an indirect approach (Sons, 1976:654-655).

Hartzler (1977) discussed the dominance of business and economic
topics in the mathematics course sequence reserved for students of
business and social science. As a consequence an increasing number of
social science students were directed to the liberal arts mathematics
courses, because such courses were "usually general enough to
accommodate the heterogeneous clientele they attract" (Hartzler, 1977:
736). He found that these courses did little to relate mathematics to
the particular interests of social science students and recommended an
entirely separate course sequence for such majors.

The contents of the principal textbooks used in liberal arts
mathematics courses were reviewed. A complete listing of these books
was placed in a separate section of the Bibliography. The approach

of most authors is to cover as wide a range of topics as possible so
that the instructor can build a course using the particular topics of
interest. The two exceptions to this statement are the books by
Growney (1986) and Roethal, Abraham, and Foley (1984). The former text
emphasizes the applications of topics from finite mathematics while
the latter stresses logic, sets, number systems, probability, and
statistics. The remaining textbooks are supported by a fairly similar
set of topics. All of them address probability to some extent. All,
but Stein (1976), include applications of statistics. All have sections
on plane geometry and beginning algebra. All, but Stein (1976) and
Wheeler (1979), provide material on mathematical logic. Most include
sections on number systems and number theory. Sets are a topic in
each text except those by Jacobs (1982) and Langbort and Thomson (1984).
Topics concerning computers and calculators are also popular choices for
inclusion and appear in each text except those by Jacobs (1982), Stein
(1979), Blitzer and Gill (1984), and Graham (1979). Topics involving
consumer mathematics, arithmetic, or the metric system are present in
several texts. All texts except those by Jacobs (1982), Stein (1984),
Blitzer and Gill (1984) include at least one of these topics.

Summary

The dichotomy between the views of the Mathematics Association
of America and influential community college educators concerning the
liberal arts mathematics course was clearly expressed in two major
references. These views were not universally accepted within their
respective academic communities. Cornutt (1984), writing for the
community college sector of higher education, suggested a much higher
level of mathematics background for liberal arts mathematics students

than that implied by the <u>New Directions</u> conference (Smith, 1984). Sons (1976), writing in the Mathematical Association of America's own journal, described a slightly more utilitarian form of the course than was later recommended by the Panel (CUPM, 1983).

The textbooks designed for the liberal arts mathematics courses tend to include a collection of topics more in line with Smith's (1984) recommendations that those of the CUPM (1983). This may be a reason why the list of references provided in the Panel report did not include any textbooks. A desire not to endorse some books over others and the fact that texts go in and out of print much more rapidly that the reference classics were the reasons given for this omission (CUPM, 1983:51).

Relationship to the Practicum

It was the dichotomy between the views of those active in community college education and the Panel of the Mathematical Association of America that formed the foundation of this study. The questionnaire statements were derived from the references reviewed. They were chosen to represent the opposing goals suggested for the liberal arts mathematics courses as well as the wide range of topics proposed by the literature or supported by the currently available textbooks.

Relationship Between the Study and the Seminar on
Curriculum and Program Planning

This study sought the creation of a meaningful core curriculum for the liberal arts mathematics course that was consistent with the philosophy of liberal arts education at Saddleback College. Curriculum concerns were at the heart of the Seminar.

Significance of the Investigation
to Saddleback College

Conflicting views for the goals and content of the liberal
arts mathematics course developed between segments of the faculty and
between the faculty and students. This course was a popular component
of the general education program taken by students whose major field
required no mathematics. It was important that this conflict be
resolved to insure meaningful student success and the integrity of
the Saddleback College curriculum.

Chapter 3

PROCEDURES

Population

The population for this study was composed of all Saddleback College full-time fine arts instructors, full-time liberal arts instructors, full-time mathematics instructors, part-time mathematics instructors and students enrolled in liberal arts or fine arts courses taught on the College campus during the Spring 1986 semester whose most probable major was either undecided or in the liberal or fine arts. During the Spring 1986 semester, Saddleback College employed 26 full-time fine arts instructors, 26 full-time liberal arts instructors, 12 full-time mathematics instructors and 25 part-time mathematics instructors. The number of students in the population was not possible to determine.

Sample

The sample chosen for this study included all full-time liberal arts and fine arts instructors. It included all 12 full-time mathematics instructors. Seven of these instructors had previously taught the liberal arts mathematics course. None of the eleven instructors who described their preferences were uninterested in teaching the liberal arts mathematics course in the future, but six were unsure of their interest. Three instructors, who had previously taught the liberal arts course, and

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two instructors, who had not, were definitely interested in teaching the course in the future. The sample included all 25 part-time mathematics instructors. Eight of these instructors had previously taught the liberal arts mathematics class and three of these were interested in teaching the course again in the future. The remaining five instructors were unsure of their interest. Only two of the 16 instructors who had not taught the course and expressed their preferences were not interested in teaching the course. Of the remaining fourteen instructors, half had an interest in teaching the course and the other half was unsure of their interest.

The sample included 66 students whose most probable major was either undecided or in the fine or liberal arts. There were 12 students with an undecided major, 27 students with a major in the liberal arts and 27 students with a major in the fine arts. Ten of these 66 students had already taken the liberal arts mathematics course. The remaining 56 students had not taken the course. Of this latter group, 12 planned to take the course in the future, 26 students were not sure and 18 planned not to take it in the future.

A cluster sampling technique was used to select students for the sample. Classes offered by the College were grouped according to academic department and discipline and printed in the Saddleback Community College District Schedule of Classes Spring 1986. Following the list of disciplines Friedlanger (1983:19) chose to constitute the humanities, remedial and skills courses such as composition, reading, music -- group lessons -- guitar, and art -- crafts were removed from consideration. Fourteen discipline areas were, consequently, selected to represent the liberal and fine arts. These areas were

art -- fundamentals, art -- design, art -- drawing, art -- history,
English literature, fine arts, French, German, humanities, music --
history and appreciation, music -- theory and composition, philosophy,
Spanish, and theater arts -- history and appreciation. One course was
selected from each of these areas at random. To make the course
selection for an area, a numbered slip of paper was drawn at random from
a hat (box). If the number on the slip of paper was n, the nth course
listed below the area heading in the Schedule of Classes was selected
as the course to be sampled. An identical random draw procedure was
used to identify a particular class section of that course to be sampled.
The desired student sample consisted of those students enrolled in any
one of these fourteen class sections whose most probable major was in
the fine arts, liberal arts, or undecided. At the time of the distri-
bution of the questionnaire, these fourteen classes had a combined
enrollment of 240 students. One hundred twenty-eight questionnaires
were returned from nine of these classes with a combined enrollment of
155. Those areas not returning student questionnaires were art --
drawing, art -- history, French, fine arts, theater arts -- history and
appreciation. Since the students in these five classes were not given
the opportunity to participate in the opinion survey, they were not
considered nonrespondents. The student portion of the sample consisted
of those students enrolled in one of the nine responding classes whose
major was in the liberal arts, fine arts or was undecided. Of the 128
returned questionnaires, 66 were from students with such a major.
Because it was possible that each of the 27 enrolled students who did
not complete a questionnaire also had a major in one of these areas, the
size of the student portion of the sample was taken to be 93. This was,

however, an upper bound for the size of the student group in the sample. It was from the responses of the 66 students that student attitude was measured in this study.

Questionnaire Development

Following a review of the literature dealing with recommendations for the goals and content of liberal arts mathematics courses and a review of the contents of liberal arts mathematics textbooks, items were selected for inclusion in a questionnaire. Because of the general nature of these items, it was decided to give the same questionnaire to all faculty members of the sample. Statements were added concerning the respondent's major field of interest and experience with the liberal arts mathematics course at Saddleback College to create the questionnaire for the student members of the sample. Statements dealing with course goals, prerequisites and content were intermingled. Response options were 0 -- "I do not wish to respond to this statement", 1 -- "I strongly disagree with this statement", 2 -- "I disagree with this statement", 3 -- "I am indifferent to this statement", 4 -- "I agree with this statement", 5 -- "I strongly agree with this statement." A photographically reduced copy of the student version of this two sided 8½ inch by 14 inch questionnaire was placed in Appendix A. The last three items of this questionnaire did not appear on the faculty version.

A three member panel of experts was called upon to review the questionnaire. Each member of the panel was a full-time instructor at Saddleback College with teaching experience in both mathematics and nonmathematics courses. They were a professor of mathematics with experience in teaching philosophy, a professor of music with experience

in teaching mathematics and a professor of psychology with experience in teaching mathematics. Their review of the questionnaire shown in Appendix A lead to the grouping of related items together. The questionniare items were grouped into the three categories of goals, extent of prior learning, and course content. Concern was expressed about the response 0 -- "I do not wish to respond." Because some of the questionnaire items were of a technical nature, it was felt that the person completing the questionnaire might want to respond but not feel sufficiently knowledgeable to do so. Consequently, another indicator was sought for responses in this category. Further, it was suggested that the response 3 -- "I am indifferent to this statement." be removed. The panel felt that respondents should be asked to clearly indicate their leanings toward agreement or disagreement on each questionnaire item. In view of these suggestions, the response options were changed. They became NF -- "I am not familiar with the mathematical content implied by this statement. Consequently, I am unsure of my feelings.", SD -- "I strongly disagree with this statement.", D -- "I disagree with this statement.", A -- "I agree with this statement.", SA -- "I strongly agree with this statement.", NR -- "I do not wish to respond to this statement." The panel felt that some unnecessary educational and mathematical jargon was present in a few questionnaire items. Suggestions were made that would make these items more readable for students and nonmathematics faculty. A revised questionnaire was the result of this committee review. A photographically reduced copy of the student version of this two sided 8½ inch by 14 inch questionnaire was placed in Appendix B. The last three items of this questionnaire did not

appear on the faculty version. The panel approved the use of this questionnaire for the pilot stage of the development process.

A pilot of the faculty version of the revised questionnaire was run using the College counseling staff. The counselors had varied academic backgrounds, knowledge of the overall College curriculum and close dealings with students involving many curriculum considerations. Consequently, it was felt that the counselors would be interested enough in a curriculum revision study to respond to the pilot questionnaires and expert enough to suggest improvements to the questionnaire itself. A questionnaire attached to a personal, handwritten note that asked them to complete the questionnaire and suggest improvements to its form was placed in each counselor's campus mail slot together with a preaddressed return envelope. A friendly, handwritten reminder was placed in the campus mail slot of each counselor who had not responded one week later. All seventeen counselors returned a questionnaire. They appeared to have no difficulty reading the questionnaire items or selecting from among the response options. One respondent felt uneasy about partic-ipating in the survey because he felt it was inappropriate to tell the Mathematics Department what to teach. Several suggestions of improvement were made. Two respondents suggested that the reasons for conducting the survey be clearly stated on the questionnaire. Cne suggestion was made for another course goal. The suggested goal was "This course teaches basic problem solving steps that can be applied to any career field/future job."

A pilot of the student version of the questionnaire shown in Appendix B was run using the students enrolled in a beginning algebra class. Because this course was a prerequisite for the liberal arts

mathematics class at Saddleback College, it was felt that the educational level and mathematical sophistication of these students would be comparable to liberal arts students contemplating completion of their mathematics general education requirement. The questionnaire was given to a single class of 27 students whose instructor volunteered the class for the pilot. All fifteen students in class on the day of the pilot completed and returned the quesionnaire. Eight of these students had majors in the liberal or fine arts. Two students had yet to settle on a major field of study. The remaining students had a major in another area. Th first questionnaire was returned after 5 minutes work by the student. Eighty percent of the questionnaires were returned within 9 minutes after the student was given a questionnaire. All questionnaires were returned within 12 minutes after the student was given a questionnaire. The students appeared to have no difficulty reading the questionnaire items or selecting among the response options. During a general class discussion immediately following completion of the pilot survey, three students suggested that the purpose of the questionnaire be stated more clearly. They felt it was a quiz on their knowledge of the current liberal arts mathematics course curriculum. They recommended that the questionnaire introduction specifically indicate that their views as students were being sought.

The panel of experts reviewed the results of the faculty and student pilots. It was decided that the purpose of the study needed to be more clearly stated, but any such statement would have to be consistent with the position of the reader in the sample. The desireability of a common questionnaire was reaffirmed. It was decided to remove all reference to the purpose of the survey from the questionniare.

A separate cover letter was drafted for each distinct segment of the sample. It would be attached to each questionnaire. A copy of the cover letter for the mathematics faculty was placed in Appendix D. A copy of the cover letter for the liberal and fine arts faculty was placed in Appendix E. A copy of the cover letter for the students in the sample was placed in Appendix F. The questionnaire itself was modified slightly. A third course goal was added as suggested by a counseling staff respondent. It was felt that this particular goal would give respondents, who were specifically interested in the occupational value of the course material, a clear way to express this opinion. Several cumbersome English phrases were also modified. A photographically reduced copy of the two sided 8½ inch by 11 inch final questionnaire was placed in Appendix C. This questionnaire was the survey instrument for this study.

Collection of the Data

A questionnaire with attached cover letter was placed in the Campus mail slot of each faculty member in the sample, along with a preaddressed return envelope for their convenience. Two weeks after the questionnaire distribution, those mathematics instructors who had not returned a questionnaire were given a handwritten note in their campus mail slot expressing a gentle reminder of the Mathematics Department's hope for their participation in the survey. Ultimately all mathematics faculty returned a completed questionnaire. Two weeks after the questionnaire distribution, a process of phoning each liberal arts and fine arts instructor who had not yet returned a completed questionnaire was begun. The calls were placed during that instructor's

College office hours and had the purpose of reinforcing the importance

their views were to the Mathematics Department and the study. This

process was discontinued after three contacts. The responses received

indicated that it was not in the Department's political best interest

or the contacted faculties emotional best interest to continue these

personal contacts. Ultimately 16 of the 26 liberal arts faculty and

11 of the 26 fine arts faculty returned a questionnaire for analysis.

In the campus mail slot of each instructor of a class selected

for participation in the student survey was placed a package of

questionnaires with attached student cover letters, a memorandum to the

instructor explaining the purpose of the survey ana a preaddressed

return envelope. A copy of this memorandum was r :ced in Appendix G.

Two weeks after the distribution of these studer.   :stionnaire packets,

a gentle reminder in the form of a handwritten note expressing the hope

of the Mathematics Department that they would take time to conduct the

survey was placed in the campus mail slot of each instructor who had not

yet returned their questionnaire package. Ultimately nine of the

fourteen instructors asked to conduct the student survey returned the

completed student questionnaires.

Analysis of the Data

A numerical value was assigned to each of the six possible

responses to a questionnaire statement. These values were 0 for

response NF, 1 for response SD, 2 for response D, 4 for response A, 5

for response SA, and 0 for response NR. The questionnaires were

gathered together into groups. The groups were part-time mathematics

faculty, full-time mathematics faculty, full-time liberal arts and fine

arts faculty, and students. On each item for which at least half of a group had responded SD, D, A, or SA, the group mean response for those giving one of these four responses was calculated. Otherwise a "no response" was recorded on that item for that group. Mean responses above 3.5 implied a group's opinion was in agreement with that questionnaire statement. Mean responses below 2.5 implied a group's opinion was in disagreement with that questionnaire statement. Any other mean response implied the group had not formed an opinion on that questionnaire statement.

Assumptions of the Investigation

It was assumed that liberal arts and fine arts students enrolled during the Spring 1986 semester had interests similar to students with these majors over the next few years. It was assumed that the instructors, who did not return a questionnaire, had little interest in the curriculum content of the liberal arts mathematics class and would thus not be concerned with any changes instituted due to this study. It was assumed that respondents expressed their true opinions on the questionnaire.

Limitations of the Investigation

The results of this study were limited to the faculty and students of Saddleback College, because it was not known if the College population was representative of any larger group of faculty or students. The results of this study were limited to those students whose most probable major was either undecided or in the areas of liberal arts and

fine arts and who were enrolled in at least one liberal arts or fine

arts course during the last month of the Spring 1986 semester.

Definition of Terms

Part-time mathematics instructors were those certificated

employees of Saddleback College who were not regular employees and

who were assigned to teach at least one class in mathematics fr.: the

Spring 1986 semester. Full-time mathematics instructors were those

certificated employees of Saddleback College who were regular employees

and members of the Mathematics Department during the Spring 1986

semester. Similarly the full-time liberal arts instructors, full-time

fine arts instructors and counselors were regular employees of Saddleback

College and members, respectively, of the Liberal Arts Division,

Division of Fine Arts and Communications, and Division of Counseling

Services and Special Programs.during the Spring 1986 semester.

Differences Between the Final Practicum
Report and the Proposal

A few changes from the practicum proposal were included in the

final practicum report. The title was changed to more clearly reflect

the purpose of the study. The full-time mathematics faculty was

included in the survey so they would have a frame of reference for

evaluating the responses of the other segments of the sample. The fine

arts faculty was added to the sample because many fine arts majors use

this course in the same way as the liberal arts students. For this

reason, fine arts students were also added to the sample.

The classes for the student survey were not selected using a random number table and the order of appearance of the course in the Schedule of Classes. When this process was attempted, a high concentration of courses in a few particular disciplines resulted. To insure a more representative sample, a single random course selection was made from each of the fourteen disciplines identified for inclusion in the study.

The recommendations of the panel of experts changed the questionnaire statement response scale slightly. Originally proposed to be a numerical scale with integer values from 0 to 5, the response options emerged as an alphabetic scale. This scale had, transparent to the respondents, a numerical conversion to the integer values from 0 to 5 excluding 3. It was also decided that a common questionnaire and separate cover letters could be used for each segment of the sample. It was felt this procedure would improve the validity of the comparisons sought between population groups.

Chapter 4

RESULTS

Based on the responses to the questionnaire, the attitudes
toward the liberal arts mathematics class of the full-time mathematics
faculty, part-time mathematics faculty, full-time liberal and fine arts
faculty and students whose most probable majors were undecided, fine
arts, or liberal arts were compared in the areas of course goals,
extent of prior learning, and subject matter content.

Goals for this Course

Each group, except the full-time mathematics faculty, agreed
that the goal of the course was for the student to learn the basic
problem solving steps that can be applied to any career field or
future job. The full-time mathematics faculty was not able to form an
opinion on this goal but agreed with the goal that would have students
gain an appreciation of mathematics. While the other two faculty
groups agreed also with the inclusion of this goal, the students found
this the least desireable goal. The students were actually not able to
form an opinion on it. No goal was agreed to by all groups. The group
mean responses for each goal were placed in Table 1.

Table 1

Mean Group Response for the Goals of the
Liberal Arts Mathematics Course

Group	Sample Size	Number of Respondents	Goal					
			#3 "Problem Solving"		#2 "Basic Skills"		#1 "Appreciation"	
			Mean	Interpretation	Mean	Interpretation	Mean	Interpretation
Full-time Math Faculty	12	12	2.9	No opinion	3.2	No Opinion	4.8	Agree
Part-time Math Faculty	25	23	4.7	Agree	4.3	Agree	4.2	Agree
Full-time Liberal and Fine Arts Faculty	52	25	4.6	Agree	4.4	Agree	4.3	Agree
Students	93	65	4.3	Agree	4.0	Agree	3.3	No Opinion

Note: 1 to 2.5- is Disagree; 2.5 to 3.5 is No Opinion; 3.5+ to 5 is Agree

23

Extent of Learning Necessary
Before Taking This Course

All four groups felt that some prior mathematics should have

been completed before the student enrolls in the liberal arts mathe-

matics class. Each of the three faculty groups agreed that arithmetic

and beginning algebra should be part of the student's prior experience

and that intermediate algebra should not. The full-time mathematics

faculty felt that geometry should also be part of the student's prior

course work while the other two faculty groups could not form an opinion

on the inclusion of geometry.in a student's course preparation. The

students in the sample were able to form an opinion only on arithmetic.

They felt a student should have completed a course in arithmetic before

taking the liberal arts mathematics class. The group mean responses

for each of the possible prerequisite courses were placed in Table 2.

All three faculty groups felt passing a placement test should be

required for a student to gain entry into this class. The part-time

mathematics faculty felt the strongest in this regard while the student

group was not able to form an opinion. The faculty groups generally were

consistent in their belief that the student should be required to pass

a placement test covering the material from courses that group felt the

student should have completed before enrolling in the liberal arts

mathematics class. The one exception involved the liberal arts and fine

arts faculty who were not able to form an opinion on the inclusion of

testing for beginning algebra. The group mean responses for each level

of mathematics that could be part of placement test for this course

were placed in Table 3.

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Table 2

Mean Group Responses for the Extent of Prior
Course Work Necessary for Liberal Arts
Mathematics Students

Group	Sample Size	Number of Respondents	None		Arithmetic		Beginning Algebra		Geometry		Intermediate Algebra	
			Mean	Opinion	Mean	Opinion	Mean	Opinion	Mean	Opinion	Mean	Opinion
Full-time Math Faculty	12	11	1.2	Disagree	5.0	Agree	4.6	Agree	4.3	Agree	2.1	Disagree
Part-time Math Faculty	25	23	1.7	Disagree	4.7	Agree	4.4	Agree	3.0	No Opinion	2.1	Disagree
Full-time Liberal and Fine Arts Faculty	52	17	1.9	Disagree	4.2	Agree	3.6	Agree	3.2	No Opinion	2.2	Disagree
Students	93	54	2.4	Disagree	4.0	Agree	3.9	Agree	3.4	No Opinion	2.9	No Opinion

Note: 1 to 2.5- is Disagree; 2.5 to 3.5 is No Opinion; 3.5+ to 5 is Agree

25

34

35

Table 3

Mean Group Responses for the Level of Mathematical Topics
That Could Appear on a Placement Test for the
Liberal Arts Mathematics Course

Group	Sample Size	Number of Respondents	Level of Mathematics Present in the Placement Test									
			No Test		Arithmetic		Beginning Algebra		Geometry		Intermediate Algebra	
			Mean	Opinion	Mean	Opinion	Mean	Opinion	Mean	Opinion	Mean	Opinion
Full-time Math Faculty	12	10	2.0	Disagree	4.8	Agree	4.5	Agree	3.9	Agree	1.6	Disagree
Part-time Math Faculty	25	21	1.7	Disagree	4.8	Agree	4.2	Agree	3.0	No Opinion	2.4	Disagree
Full-time Liberal and Fine Arts Faculty	52	19	2.1	Disagree	4.4	Agree	3.3	No Opinion	2.8	No Opinion	1.8	Disagree
Students	93	54	2.9	No Opinion	Not applicable since no opinion was reached on placement testing							

Note: 1 to 2.5- is Disagree; 2.5 to 3.5 is No Opinion; 3.5+ to 5 is Agree

Subject Matter Content for this Course

Although there was a considerable amount of variation among
the groups concerning the topics each preferred to be offered, the
presence of some topics was agreed to by all. It was agreed by all
groups that among the topics for the liberal arts mathematics
course should be included a discussion of the fundamentals of
mathematical reasoning and logic, a discussion of funtions and graphs,
a discussion of probability and "odds", a discussion of recent
developments and discoveries in mathematics, a discussion of computer
technology, a discussion of statistics, and a discussion of the methods
of organization using sets.

None of the subject matter items were rejected by all four
groups. The faculty groups universally rejected the idea of offering
the class in an open form where students work on mathematical projects
of their own choosing with guidance from the instructor. In addition,
the full-time mathematics faculty rejected the inclusion of a discussion
of the techniques of arithmetic operations using whole numbers, decimals
and fractions. The part-time mathematics faculty could not form an
opinion on this item but both the arts faculty and students felt it
should be part of the course. The student group only rejected the item
dealing with the inclusion of term papers, book reports, and library
research assignments as a means of making students aware of the large
body of interesting writings about mathematics. Both full-time faculty
groups felt this item should be included, while the part-time mathematics
faculty formed no opinion. For each group the subject matter content

items were listed in Appendix II in descending order according to the
value of the mean response.

Free Responses

Each of the three qestionnaire divisions contained an oppor-
tunity for the respondent to describe an appropriate item not included
in the existing list. If used at all, respondents most often used these
free response opportunities to justify or elaborate on another response
somewhere else in the questionnaire. A few responses, however,
suggested additional areas of interest within each division.

In the area of goals for this course, a liberal arts instructor
felt that students should acquire some insight into mathematical short
cuts. A full-time mathematics instructor felt the student should
gain computer sense and a part-time mathematics instructor supported
this with the belief that the student should learn to use software on
a computer.

In the area of the subject matter content for this course,
several suggestions were made. A liberal arts student felt a discussion
of investments, banks, interest rates, and how they work should be
included. Another liberal arts student suggested that topics be covered
briefly. In this way the student could gain a general overview of many
areas of mathematics. A liberal arts instructor felt that logical
translations from natural to symbolic languages should be included in the
course content. In addition, truth theories, number theory and a few
famous paradoxes should be discussed. A part-time mathematics instructor
suggested that problem solving techniques be included. A full-time

mathematics instructor felt that applications of material in this course should be introduced to the students through use of computer software in the computer laboratory.

Course Core Curriculum

The core content for the curriculum of the liberal arts mathematics course was found by incorporating any item that received a mean response value of 4.0 or higher from any two of the three groups remaining after the full-time mathematics faculty was removed from the sample. This was done to allow the full-time mathematics faculty a clear view of the feelings of the other segments of the sample during their official review of the curriculum for this course.

The core curriculum should contain:

* A discussion of the fundamentals of mathematical reasoning and logic

* A discussion of measurement and the metric system

* A discussion of probability and "odds"

* A discussion of statistics

* A discussion of functions and graphs

* This course should fulfill the "mathematics proficiency" portion of the Associate Degree graduation requirements.

Chapter 5

DISCUSSION, IMPLICATIONS AND
RECOMMENDATIONS

Discussion

Following a review of the topics of most interest to students
as shown in Appendix H, it was clear that students desired a very
practical orientation for this class. Of almost unquestioned importance
was the need for this course to satisfy the Associate Degree graduation
requirement. They showed interest in topics related to the metric system,
consumer mathematics, mathematical reasoning, arithmetic, beginning
algebra, beginning geometry, computer technology, probability and
statistics. This applied emphasis was consistent with Smith's (1984)
suggestions for the directions of this course and well supported by
the available textbooks. The full-time mathematics faculty assumed an
almost opposing view to that of the students. They rejected the
inclusion of topics from arithmetic and could not agree to include any
of the student selected topics listed above except the discussions of
probability, statistics, mathematical reasoning, and computer technology.
The full-time mathematics faculty seemed to most closely support the
CUPM's (1983) position that the purpose of the course was to give the
student an appreciation of mathematics and not an opportunity to do
remedial work in mathematics. The part-time mathematics faculty took
the middle ground between these two positions. They supported topics
including consumer mathematics, beginning algebra, and beginning

30

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geometry, but could not agree on the inclusion of arithmetic material. This group of faculty, however, was most strongly in support of an entrance examination covering arithmetic and beginning algebra. The liberal arts and fine arts faculty also supported an entrance test covering arithmetic. It was clear, from a faculty point of view, that the ability to demonstrate competency in arithmetic should be required for entry into the liberal arts mathematics class. The liberal arts and fine arts faculty agreed to the inclusion of every content item available except two. They rejected the open classroom format, but could not form an opinion on the inclusion of topics in consumer mathematics.

Implications

A wide disparity existed between the interests of the students who may take the liberal arts mathematics course and the full-time mathematics faculty who determine the course curriculum. Caught between these two groups were the interests of the instructors most likely to teach this class, the part-time mathematics faculty. They neither determined the curriculum or entirely supported it. They were, however, required to present it to the students. There was thus the potential for severe frustration on both the part of the faculty and students which could severely damage the ability to attract students or instructor to the course. If this situation was left unresolved the reputation of the College could be severely damaged with that segment of the community oriented toward liberal or fine arts education.

Recommendations

The following recommendations are made to the Saddleback College Mathematics Department for their consideration during the process of curriculum review for the liberal arts mathematics course.

It is recommended that entry into the liberal arts mathematics course be restricted to those students who have previously completed courses in arithmetic and beginning algebra, and who have demonstrated proficiency with arithmetic operations and concepts on a Departmentally sponsored test.

It is recommended that the content of the course be built around a core curriculum composed of the following topics:

* A discussion of the fundamentals of mathematical reasoning and logic

* A discussion of measurement and the metric system

* A discussion of probability and "odds"

* A discussion of statistics

* A discussion of functions and graphs.

It is recommended that the liberal arts mathematics course fulfill the "mathematics proficiency" portion of the Associate Degree graduation requirements.

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APPENDIX A

INITIAL VERSION OF THE QUESTIONNAIRE
FOR STUDENTS

MATHEMATICS CURRICULUM REVIEW

A Questionnaire Concerning the Math 5 Course

Mathematics For Liberal Arts Students

The Mathematics Department at Saddleback College is currently reviewing the goals and content of Math 5 — "Mathematics For Liberal Arts Students". This course is generally taken by students seeking to meet the "mathematical concepts" portion of the general education certification for transfer to the California State University System and whose major fields require no other mathematics. Often students in the arts and humanities take Math 5 for this reason. Many students also take Math 5 to fulfill the "mathematics proficiency" portion of the Associate Degree graduation requirements.

We are very interested in your views on this course and would be most appreciative if you could take time to consider the following statements. Please circle the number to the right which best corresponds to your feelings concerning that statement. The number scale is described below:

```
0 — I do not wish to respond to this statement.
1 — I strongly disagree with this statement.
2 — I disagree with this statement.
3 — I am indifferent to this statement.
4 — I agree with this statement.
5 — I strongly agree with this statement.
```

1. A discussion of statistics should be included.   0 1 2 3 4 5

2. The relationship between mathematics and our cultural
   heritage should be included.   0 1 2 3 4 5

3. A Discussion of consumer mathematics should be included.   0 1 2 3 4 5

4. There should be no prior mathematics courses required
   for entry into this course.   0 1 2 3 4 5

5. A discussion of mathematical logic should be included.   0 1 2 3 4 5

6. The role of mathematics in history and the role of
   history in mathematics should be included.   0 1 2 3 4 5

7. A discussion of computer technology should be
   included.   0 1 2 3 4 5

8. Competency in intermediate algebra (i.e. two years of
   high school algebra) should be required for entry
   into this course.   0 1 2 3 4 5

9. A discussion of arithmetic should be included.   0 1 2 3 4 5

10. The nature of contemporary mathematics should be included.   0 1 2 3 4 5

11. If an instructor interested in teaching a section of
    this course can not be found, it should be cancelled.   0 1 2 3 4 5

12. A discussion of measurement and the metric system
    should be included.   0 1 2 3 4 5

13. Competency in arithmetics should be required for entry
    into this course.   0 1 2 3 4 5

14. The recent emergence of several mathematical sciences
    should be included.   0 1 2 3 4 5

15. A discussion of algebra should be included.   0 1 2 3 4 5

16. Term papers or other essay assignments should be included.   0 1 2 3 4 5

17. Competency in plane geometry (i.e. high school geometry)
    should be required for entry into this course.   0 1 2 3 4 5

Please continue on the reverse side.

18. The necessity of doing mathematics to learn mathematics
should be included.   0 1 2 3 4 5

19. A discussion of probability should be included.   0 1 2 3 4 5

20. If an insufficient number of interested instructors
exist for this course, it should be offered in a large
class format by the available staff.   0 1 2 3 4 5

21. A discussion of sets should be included.   0 1 2 3 4 5

22. The role of mathematics as a tool for problem·
solving should be included.   0 1 2 3 4 5

23. A competency in beginning algebra (i.e. one year of
high school algebra) should be required for entry
into this course.   0 1 2 3 4 5

24. A discussion of number systems should be included.   0 1 2 3 4 5

25. There should be a standard course content used for
all sections of this course.   0 1 2 3 4 5

26. The verbalization and reasoning necessary to understand
symbolism should be included.   0 1 2 3 4 5

27. A discussion of geometry should be included.   0 1 2 3 4 5

28. The building of basic mathematical skills should
be included.   0 1 2 3 4 5

29. A discussion of functions and graphs should be included. 0 1 2 3 4 5

30. The existence of a large body of interesting writing
about mathematics should be included.   0 1 2 3 4 5

31. The course should be offered in an "open" format where
students work on individually determined investigations
concerning mathematics.   0 1 2 3 4 5

32. Other: _____

_____

_____

Please circle the correct answer for questions numbered 33 and 34.

33. Have you already completed a Math 5 class?   Yes   No

34. Will you be taking Math 5 in the future?   Yes   No   Maybe

Please indicate your major field of interest (such as art, music, literature,
language, chemistry and so on) in the space below:

_____

REVISED VERSION OF THE QUESTIONNAIRE
FOR STUDENTS (PILOT QUESTIONNAIRE)

MATHEMATICS CURRICULUM REVIEW

A Questionnaire Concerning the Math 5 Course

Mathematics For Liberal Arts Students

The Mathematics Department at Saddleback College is currently reviewing the goals and content of Math 5 — "Mathematics For Liberal Arts Students". This course is generally taken by students seeking to meet the "mathematical concepts" portion of the general education certification for transfer to the California State University System and whose major fields require no other mathematics. Often students in the arts and humanities take Math 5 for this reason. Many students also take Math 5 to fulfill the "mathematics proficiency" portion of the Associate Degree graduation requirements.

We are very interested in your views on this course and would be most appreciative if you could take time to consider the following statements. Please circle the abbreviation to the right which best corresponds to your feelings concerning that statement. The abbreviations are described below:

NF — I am not familiar with the mathematical content implied by this statement. Consequently, I am unsure of my feelings.
SD — I strongly disagree with this statement.
D — I disagree with this statement.
A — I agree with this statement.
SA — I strongly agree with this statement.
NR — I do not wish to respond to this statement.

GOALS:

1. Through this course, the student will gain an appreciation   NF SD D A SA NR
of mathematics.

2. Through this course, the students will improve their basic   NF SD D A SA NR
computational skills in the areas of arithmetic, algebra
and geometry.

3. Other:_____

EXTENT OF PRIOR LEARNING:

4. Before taking this course, the student should have already
completed a course (at sometime in the past) in:

     a) Prior completion of course work in mathematics   NF SD D A SA NR
     should not be required.

     b) Arithmetic   NF SD D A SA NR

     c) Beginning Algebra (first year high school algebra)   NF SD D A SA NR

     d) Geometry (one year of high school geometry)   NF SD D A SA NR

     e) Intermediate Algebra (second year high school algebra)   NF SD D A SA NR

5. To qualify for entry into this class, the student should
pass a test covering material from:

     a) No such test should be required   NF SD D A SA NR

     b) Arithmetic   NF SD D A SA NR

     c) Beginning Algebra   NF SD D A SA NR

     d) Geometry   NF SD D A SA NR

     e) Intermediate Algebra   NF SD D A SA NR

6. Other:_____

_____

CONTENT:

7. The relationship between mathematics and our cultural   NF SD D A SA NR
   heritage should be included.

8. The role of mathematics in history and the role of   NF SD D A SA NR
   history in mathematics should be included.

9. A discussion of recent developments and discoveries   NF SD D A SA NR
   in mathematics should be included.

10. Through term papers, book reports, and library   NF SD D A SA NR
    research assignments, students should become
    aware of the existence of a large body of
    interesting writing about mathematics.

11. A discussion of functions and graphs should be included. NF SD D A SA NR

12. A discussion of the fundamentals of mathematical   NF SD D A SA NR
    reasoning and logic should be included.

13. A discussion of computer technology should be included. NF SD D A SA NR

14. A discussion of the methods of organization using NF SD D A SA NR
    sets should be included.

15. A discussion of probability and "odds" should   NF SD D A SA NR
    be included.

16. A discussion of statistics should be included.   NF SD D A SA NR

17. A discussion of beginning geometry should be included. NF SD D A SA NR

18. A discussion of measurement and the metric system NF SD D A SA NR
    should be included.

19. A discussion of beginning algebra should be included. NF SD D A SA NR

20. A discussion of alternative ways of numbering (as NF SD D A SA NR
    opposed to our base 10 system) should be included.

21. A discussion of mathematical topics of interest to NF SD D A SA NR
    consumers (such as checking accounts, installment
    buying) should be included.

22. A discussion of the techniques of arithmetic   NF SD D A SA NR
    (adding, multiplying and so on of whole numbers,
    decimals and fractions) should be included.

23. The course should be offered in an "open" form where NF SD D A SA NR
    students work on mathematical projects of their own
    choosing with guidance from the instructor.

24. This course should fulfill the "mathematics proficiency" NF SD D A SA NR
    portion of the Associate Degree graduation requirements.

25. Other:_____

_____

Please circle the correct answer for questions 26 and 27.

26. Have you already completed a Math 5 class?   Yes   No

27. Will you be taking Math 5 in the future?   Yes   No   Maybe

Please indicate your major field of study (such as English literature, chemistry,
German, etc.) in the space below:

APPENDIX C

FINAL VERSION OF THE QUESTIONNAIRE
USED IN THIS STUDY

SADDLEBACK COLLEGE DEPARTMENT OF MATHEMATICS
Questionnaire Concerning the Course

"Mathematics for Liberal Arts Students"

Please consider each statement below. In each case circle the abbreviation to the right which best corresponds to your feelings concerning that statement. The abbreviations are described below:

NF — I am not familiar with the mathematical content implied by this statement. Consequently, I am unsure of my feelings.
SD — I strongly disagree with this statement.
D — I disagree with this statement.
A — I agree with this statement.
SA — I strongly agree with this statement.
NR — I wish to give no response to this statement.

GOALS FOR THIS COURSE:

1. The student should gain an "appreciation" of mathematics. In other   NF SD D A SA NR
words, the student should come to understand the historical and
contemporary role of mathematics, and to place mathematics
properly in the context of other human intellectual achievements.

2. The student should review and complete their study of basic   NF SD D A SA NR
computational skills in the areas of arithmetic, beginning algebra
and beginning geometry.

3. The student should learn the basic problem solving steps that can   NF SD D A SA NR
be applied to any career field or future job.

4. Other:_____

EXTENT OF LEARNING NECESSARY BEFORE TAKING THIS COURSE:

5. Before taking this course, the student should have completed a
course (or its equivalent) in:

    a) NO prior course work in mathematics should be necessary for   NF SD D A SA NR
      success in this class.

    b) Arithmetic   NF SD D A SA NR

    c) Beginning Algebra (first year high school algebra)   NF SD D A SA NR

    d) Geometry (high school geometry)   NF SD D A SA NR

    e) Intermediate Algebra (second year of high school algebra)   NF SD D A SA NR

6. For entry into this class, the student should be required to
pass a placement test with material taken from:

    a) NO placement test should be required for entry into this class.   NF SD D A SA NR

    b) Arithmetic   NF SD D A SA NR

    c) Beginning Algebra (first year high school algebra)   NF SD D A SA NR

    d) Geometry (high school geometry)   NF SD D A SA NR

    e) Intermediate Algebra (second year high school algebra)   NF SD D A SA NR

7. Other:_____

(PLEASE COMPLETE THE REVERSE SIDE ALSO)

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SUBJECT MATTER CONTENT FOR THIS COURSE:

8. The relationship between mathematics and our cultural
   heritage should be included.   NF SD D A SA NR

9. The role of mathematics in history and the role of history
   in mathematics should be included.   NF SD D A SA NR

10. A discussion of recent developments and discoveries in
    mathematics should be included.   NF SD D A SA NR

11. Through term papers, book reports, and library research
    assignments, students should become aware of the existence   NF SD D A SA NR
    of a large body of interesting writings about mathematics.

12. A discussion of functions and graphs should be included.   NF SD D A SA NR

13. A discussion of the fundamentals of mathematical reasoning
    and logic should be included.   NF SD D A SA NR

14. A discussion of computer technology should be included.   NF SD D A SA NR

15. A discussion of the methods of organizati using sets
    should be included.   NF SD D A SA NR

16. A discussion of probability and "odds" shou   cluded.   NF SD D A SA NR

17. A discussion of statistics should be included.   NF SD D A SA NR

18. A discussion of beginning geometry should be included.   NF SD D A SA NR

19. A discussion of measurement and the metric system should
    be included.   NF SD D A SA NR

20. A discussion of beginning algebra should be included.   NF SD D A SA NR

21. A discussion of alternative ways of numbering (as with
    "clock" arithmetic in base 12) should be included.   NF SD D A SA NR

22. A discussion of mathematical topics related to the
    interests of consumers (such as checking accounts,   NF SD D A SA NR
    installment buying) should be included.

23. A discussion of the techniques of arithmetic operations
    using whole numbers, decimals and fractions should   NF SD D A SA NR
    be included.

24. The course should be offered in an "open" form where
    students work on mathematical projects of their own   NF SD D A SA NR
    choosing with guidance from the instructor.

25. This course should fulfill the "mathematics proficienty"
    portion of the Associate Degree graduation requirements.   NF SD D A SA NR

26. Other:_____

THANK YOU!

Saddleback College

The Mathematics Department is currently reviewing the goals, prerequisites and content of Mathematics 5 — "Mathematics for Liberal Arts Students". We are willing to leave the course in its current form, modify it selectively or completely overhaul it. We seek the form for this course that will best serve the needs of the students of Saddleback College and are most interested in your opinions concerning what Math 5 should be.

"Mathematics for Liberal Arts Students" is often taken by students seeking to meet the "mathematical concepts" portion of the general education certification for transfer to a branch of the California State University system and whose major fields require no other mathematics. Many students in the arts and humanities take Math 5 for this reason. Some students also take Math 5 to satisfy the "mathematics proficiency" portion of the Associate Degree graduation requirements.

As a member of the Mathematics Department with a great deal of knowledge of and experience with mathematics your opinion is critically important to this curriculum review. Please take time to answer the following questions and respond to the attached statements. This is not a test of your knowledge of the current make up of the Math 5 course. Let us know what you would like the transfer level "general education" mathematics course at Saddleback College to be.

When you are finished, please return this questionnaire to:

> Steve Sworder
> Mathematics Department
> Saddleback College

Thank you,

Please circle the appropriate answer for each of the following two questions.

a) Have you taught Math 5 in the past?   Yes   No

b) Would you be interested in teaching Math 5 in the future?   Yes   No   Maybe

44/45

Saddleback College

MEMORANDUM

The Mathematics Department is currently reviewing the goals, prerequisites and content of Mathematics 5 — "Mathematics for Liberal Arts Students". We are willing to leave the course in its current form, modify it selectively or completely overhaul it. We seek the form for this course that will best serve the needs of the students of Saddleback College and are most interested in your opinions concerning what Math 5 should be.

"Mathematics for Liberal Arts Students" is often taken by students seeking to meet the "mathematical concepts" portion of the general education certification for transfer to a branch of the California State University system and whose major fields require no other mathematics. Many students in the arts and humanities take Math 5 for this reason. Some students also take Math 5 to satisfy the "mathematics proficiency" portion of the Associate Degree graduation requirements.

Because Math 5 is an integral component of the "general education" core taken by many students at Saddleback College, we feel the course should conform to the general education philosophy of the College and be a valuable part of the students' overall education. In an effort to gain a better appreciation for the direction this course should take, we plead with you to take a few moments and share your expertise in the arts and humanities with us by completing the attached questionnaire. This is not a test of your knowledge of the current make up of the Math 5 course. Let us know what you would like the transfer level "general education" mathematics course at Saddleback College to be.

When you are finished, please return this questionnaire to:

        Steve Sworder
        Mathematics Department
        Saddleback College

    Thank you,

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Saddleback College

MEMORANDUM

Students of Saddleback College,

The Mathematics Department is currently reviewing the goals, required background and content of Math 5 -- "Mathematics for Liberal Arts Students". We seek the form for this course that will best serve your needs and are most interested in your opinions concerning what Math 5 should be.

"Mathematics for Liberal Arts Students" is often used by a student, whose major course of study requires no other mathematics, to satisfy the "mathematical concepts" portion of the general education certification for transfer to a branch of the California State University (e.g. Fullerton, Long Beach, San Diego State, etc.) or certain branches of the University of California depending on the student's major. Many students in the arts and humanities take Math 5 for this reason. Math 5 is also used by a number of students to satisfy the "mathematics proficiency" portion of the Associate Degree graduation requirements.

In an effort for us to gain a better appreciation for the direction this course should take, we plead with you to take a few moments to answer the questions below and complete the attached questionnaire. This is not a test of your knowledge of the current make up of the Math 5 class. Rather, we would like to know what you would like the transfer level "general education" mathematics course at Saddleback College to be.

> Thank you,
>
> Mathematics Department
> Saddleback College

Please circle the appropriate response for each of the following questions:

a) Have you already taken Math 5?   YES   NO

b) Will you be taking Math 5 in the future?   YES   NO   MAYBE

c) In what general area does your most probable major course of study lie?

Social Science	Physical Science	Fine Arts	Liberal Arts
Natural Science	Applied Technology	Business	Humanities
Foreign Language	Undecided	Other:_____	

Please Specify
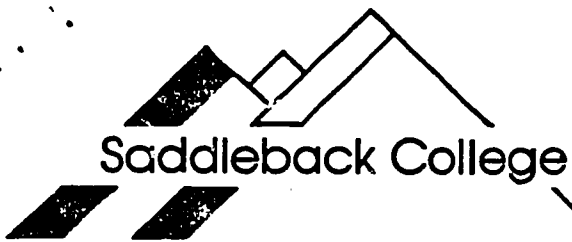
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Saddleback College

MEMORANDUM

The Mathematics Department is currently reviewing the goals, prerequisites

and content of Math 5 -- "Mathematics for Liberal Arts Students". We desperately

need the views of students and plead for your help. Because most Math 5 students

take no other mathematics classes, we have no way of sampling the general

population of possible students within our own curriculum. We have consequently

selected, in an as unbiased manner as possible, 20 class sections in the Liberal

Arts, Humanities and Fine Arts to be polled. If there is any possible way you

could give your students in

a few moments to complete the enclosed questionnaire we will be forever in your debt.

If you are able to give the survey to your class, could you note the

number of students receiving a questionnaire in the space below (we need to monitor

our nonresponse bias) and return them to:

> Steve Sworder
> Mathematics Department
> Saddleback College

Thank you,

_____: Number of students given a questionnaire.

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APPENDIX H

COURSE CONTENT GROUP MEAN RESPONSES
IN DESCENDING ORDER

Table 4

Course Content Mean Responses
Full-time Mathematics
Faculty

Statement Number	Descriptive Phrase	Number of Respondents	Mean Response
9	History	12	4.58
8	Cultural Heritage	12	4.58
17	Statistics	11	4.36
13	Math Reasoning	11	4.36
16	Probability	12	4.25
10	Recent Developments	11	4.18
11	Term Papers	12	4.17
15	Sets	11	4.00
14	Computer Technology	11	3.91
12	Graphs	10	3.90
21	Numbering	9	3.67
25	Math Proficiency	11	3.45
19	Measurement	12	3.33
20	Algebra	12	3.00
18	Geometry	12	3.00
22	Consumer Math	12	2.67
23	Arithmetic	8	2.13
24	Open Format	9	1.78

Table 5

Course Content Mean Responses
Part-time Mathematics
Faculty

Statement Number	Descriptive Phrase	Number of Respondents	Mean Response
13	Math Reasoning	23	4.35
16	Probability	23	4.30
12	Graphs	23	4.26
14	Computer Technology	24	4.25
17	Statistics	23	4.13
25	Math Proficiency	21	4.05
19	Measurement	22	4.05
18	Geometry	24	4.00
20	Algebra	23	3.74
9	History	23	3.74
22	Consumer Math	22	3.73
15	Sets	22	3.68
10	Recent Developments	22	3.68
8	Cultural Heritage	19	3.47
23	Arithmetic	23	3.35
11	Term Papers	20	3.00
21	Numbering	19	2.79
24	Open Format	20	2.10

Table 6

Course Content Mean Responses
Full-time Liberal Arts and
Fine Arts Faculty

Statement Number	Descriptive Phrase	Number of Respondents	Mean Response
13	Math Reasoning	23	4.60
10	Recent Developments	22	4.36
16	Probability	23	4.13
19	Measurement	23	4.09
23	Arithmetic	24	4.08
17	Statistics	24	4.08
12	Graphs	22	4.05
9	History	24	3.96
25	Math Proficiency	20	3.95
20	Algebra	20	3.90
14	Computer Technology	23	3.87
8	Cultural Heritage	23	3.87
15	Sets	13	3.85
21	Numbering	19	3.68
18	Geometry	22	3.59
11	Term Papers	23	3.52
22	Consumer Math	24	3.42
24	Open Format	18	2.33

Table 7

Course Content Mean Responses
Liberal and Fine Arts
Students

Statement Number	Descriptive Phrase	Number of Respondents	Mean Response
25	Math Proficiency	59	4.10
19	Measurement	63	4.02
22	Consumer Math	62	4.00
13	Math Reasoning	60	4.00
20	Algebra	63	3.94
23	Arithmetic	63	3.90
12	Graphs	57	3.89
18	Geometry	61	3.79
14	Computer Technology	58	3.76
16	Probability	57	3.75
10	Recent Developments	55	3.75
17	Statistics	61	3.61
15	Sets	49	3.55
9	History	61	3.20
21	Numbering	49	3.14
8	Cultural Heritage	60	2.97
24	Open Format	53	2.87
11	Term Papers	55	2.16

Table 8

Course Content Mean Responses
Full-time Counseling
Staff

Statement Number	Descriptive Phrase	Number of Respondents	Mean Response
13	Math Reasoning	13	4.46
19	Measurement	13	4.38
10	Recent Developments	13	4.38
12	Graphs	11	4.27
25	Math Proficiency	12	4.25
17	Statistics	13	4.23
8	Cultural Heritage	12	4.17
14	Computer Technology	13	4.08
9	History	13	4.00
15	Sets	13	3.80
16	Probability	13	3.69
18	Geometry	13	3.31
22	Consumer Math	12	3.25
20	Algebra	13	3.23
21	Numbering	9	3.11
23	Arithmetic	12	2.75
11	Term Papers	12	2.59
24	Open Format	11	1.82