How To Do It Handbook

Department Overview

The Mathematical and Computer Sciences Department is one of nine academic divisions at Parkland College. Instruction is delivered by 21 full-time faculty and 35 part-time faculty, with 0-31 years of teaching experience at Parkland. Of the twenty-one full-time faculty members, four have earned doctorates and the remainder have at least a master’s degree. Members of the department have collaboratively developed a well-articulated mathematics and computer science curriculum. Curriculum offerings included the following transfer-oriented majors: Mathematics(A.S.) and Computer Science(A.S.). Additionally, seven occupational programs are available for students: Computer Networking (A.A.S./Certificate); Computer Visualization: Graphics Animator, Graphics Programmer, Web Programmer(A.A.S.); Computer Science: Web Server Administration, Website Programmer (A.A.S.). Also, Parkland’s mathematics departments offers several developmental as well as career/technical mathematics courses.

The following courses offered by the Mathematical and Computer Sciences Department were included in Parkland’s case study: College Algebra (MAT 124); Calculus and Analytic Geometry I/II (MAT 128/129); Calculus and Analytic Geometry III and Introductory Matrix Theory (MAT 228); Mathematics for Elementary Teachers (MAT 105). Students who enroll in these courses are most often pursuing a degree in one of the following fields: Computer Networking; Computer Science; Engineering; Mathematics; Physics; Pre-professional Concentrations; Chemistry; Computer Visualization; Business Administration; Elementary Education.

Currently, Parkland College is carrying out a college-wide plan for academic assessment. The Mathematical and Computer Sciences Department has identified the main goals and intended student outcomes for a group of transfer mathematics courses which includes the five targeted case study courses. In addition, assessment methods and criteria for the expected student outcomes are being revised and data is being collected and analyzed.

The Mathematical and Computer Sciences Department supports and is actively incorporating reform in college mathematics, as defined by the American Mathematical Association of Two-Year Colleges (AMATYC) and reported in their document Crossroads in Mathematics: Standards for Introductory College Mathematics Before Calculus. The department does not yet have a stated plan for implementing reform on a large scale; however reform efforts are being made gradually and take several forms, depending on both the course and the instructor.

The Parkland College Class Schedule states that all students in four of the five case study courses (as well as others) are required to obtain and use a graphics calculator. In many sections, other graphing utilities and/or Computer Algebra Systems are also utilized. For example, the software Cyclone or Mathematica is used to graph surfaces in the Calculus and Analytic Geometry III and Introductory Matrix Theory course. The use of these forms of technology both in and outside of class have enhanced content, delivery and student experiences, and addresses the use of the rule of three: students will be able to analyze quantitative relationships symbolically, numerically, and graphically.

Reform is expected to be a part of Parkland’s mathematics curriculum and the department’s academic assessment plan includes methods to assess the effects that reform
implementation in our mathematics courses has on its students.

Faculty members within the Mathematical and Computer Sciences Department are actively involved with the use of technology. The department’s faculty members attend and regularly make presentations at national and state conferences, including the AMATYC, the Illinois Mathematics Association of Community Colleges (IMACC), the Mathematical Association of America (MAA), the Illinois Section of the Mathematics Association of America (ISMAA), the National Council of Teachers of Mathematics (NCTM), the Illinois Council of Teachers of Mathematics (ICTM), and the International Conference on Technology in Collegiate Mathematics (ICTCM). In-service workshops are offered for members of the department on a regular basis; these workshops are primarily concerned with the use of technology in the classroom.

As a result of the “open door” admissions policy that characterizes comprehensive community colleges in Illinois, students arrive at Parkland with diverse learning styles, attitudes, abilities, and prior experiences. The largest number of students from Parkland College that transfer to a four-year college or university, attend the University of Illinois at Urbana–Champaign (UIUC). Similarly, the largest number of transfer students accepted by the University of Illinois at Urbana–Champaign come from Parkland College.

MATHEMATICAL AND COMPUTER SCIENCES DEPARTMENT
MISSION STATEMENT

The Mission of the Mathematical and Computer Sciences Department is to maintain up-to-date curricula and programs in mathematics and computer science, to teach students critical thinking and quantitative reasoning and to develop the students’ mathematical and computer literacy. A significant component of this mission is to teach:

- developmental mathematics courses for under-prepared students
- technical mathematics courses to prepare students in the mathematics required in their career programs
- transfer mathematics and computer sciences courses to prepare students to continue their education at a four-year institution
- computer science courses that are a part of programs designed to prepare students for positions in the information technology field
- computer science courses for students upgrading their computer skills.

The Department is committed to academic excellence and continually examines its teaching methods and uses of technology in order to provide students with the best possible learning environment and the opportunity to examine applications of mathematics and computer science. The Department is also committed to working with businesses and high schools in District 505 to provide enrichment opportunities and continuing education for area students and employees.
History and Implementation
In Fall 1995, Dale Ewen, Vice President of Academic and Student Services at Parkland College, and LaVerne McFadden, Chair of the Mathematical and Computer Sciences department, were asked to host the community college site of the proposed NSF indicators project. Parkland was carrying out a college–wide assessment of its academic programs and it was believed that the indicators project would be beneficial in this effort. In particular, Parkland was interested in examining how the AMATYC standards were being incorporated into their mathematics curriculum and instruction. The transfer mathematics course academic assessment committee was given the task of drafting Parkland’s proposal to be submitted as part of the NSF indicators project. A coordinator was selected from this committee and a budget request was written up. The budget request included fund requests for the following: salaries for a coordinator, the vice president of academic affairs (principal investigator), the chair of the Mathematical and Computer Sciences department (co-principal investigator), secretarial support, and institutional research support. Also requested were funds for travel expenses and consultant services.

Funding was not granted by NSF until May 1997. During the Spring 1997 semester, Parkland’s coordinator reviewed background materials in preparation for the anticipated project. Among these materials were: “Student Assessment in Calculus” – Schoenfeld et al., “Charting the Course: Quality Indicators for Undergraduate Mathematics Education”– Travers et al., “Student Outcomes and Assessment”– Schoenfeld and Dossey, and “Crossroads in Mathematics”– AMATYC. After the funding was granted, a general meeting was held at UIUC in late June 1997. An advisory committee consisting of three faculty from community colleges across the country was set up for Parkland. In addition to Parkland’s three member group, three faculty from the transfer course academic assessment committee attended the conference. A general set of indicators was roughed out during the meeting which fell into five categories (as described in the “Charting the Course” document). These categories were: 1. Department, 2. Curriculum, 3. Faculty, 4. Classroom Practices, and 5. Students. Parkland proposed to conduct a case study of their college algebra course. This course was selected for a number of reasons including: “Reform” sections of this course had been field-tested at Parkland

This course is offered at all community colleges and has high enrollments but also high attrition rates.

For the rest of the summer, preparations were made for the case study to be conducted at Parkland during the Fall 1997 semester. A first day student survey to assess student attitudes about mathematics was developed. This survey was modeled after the survey UIUC had used in its calculus courses and the Grade 12 – Student questionnaire used in the SIMS study. Input was also given by other faculty members on the transfer course assessment committee. The survey was created with “Pulsesurvey” software by Parkland’s director of academic computing.

After discussions at a mathematics department meeting, the best time to hand out the survey was determined to be on the first day of class. It was also suggested that it be as short as possible and printed on one page front to back to appear concise to the
students. The surveys were placed in the instructors’ mailboxes at least one week prior to the first day of class to give them enough time to plan their first day activities. The surveys were collected over a two week period by the coordinator and the data was analyzed with the “Pulsesurvey” software. One problem that occurred with the responses on the first day survey was that the number of credit hours enrolled, as reported by some of the students, did not match those on the student database. As a result, the student database was used to obtain this information and this question was deleted from the survey.

The next round of data collection was planned for midterm of the Fall 1997 semester. A midterm student survey was created with the “Pulsesurvey” software. This survey contained a few questions from the first day survey as well as questions regarding computer usage (as suggested by the MSTE office). In addition, four questions regarding the percent time spent by the instructor on various classroom activities were added to this survey. These questions related directly to the AMATYC standards and were asked to determine to what degree the current classroom practices had changed from the traditional lecture format and how much technology was being used in the classroom. These four questions were also asked of the instructors as part of a “logbook” in which the instructors were asked to describe their teaching methods and topic content for the week of midterm. The instructors were also asked to list the homework problems assigned for the midterm week. In addition, during this week, all students enrolled in college algebra who used the Peer Tutoring Lab were monitored and a brief description of the topic and type of questions asked was recorded in a logbook.

The surveys were collected over a two week period by the coordinator and the data analyzed with the “Pulsesurvey” software. This software could not analyze the four questions regarding classroom practices. After consultation with the director of academic computing, a student worker was asked to type in all of the responses into a word processing program and save it as a file in ASCII text. The text file entries began with the student’s student I.D. number and were followed by their responses. Unfortunately, some student’s responses regarding the percent time spent on classroom activities did not add up to 100 percent and were not used in the final data analysis.

One key question on this survey and on the first day survey concerned the number of hours spent working outside the college. (This question was later placed on the beginning of semester surveys given to all sites in Spring 1998.) Data analysis was later carried out to examine how the number of credit hours enrolled in courses compared with the number of hours spent working outside the college and how these two factors relate to the students mathematics achievement. This data analysis was carried out by the director of institutional research during June 1998 using data collected from the student midterm surveys for Fall 1997 and Spring 1998.

A client discipline survey was drafted after discussions with chemistry and physics faculty at Parkland. These surveys were given to chemistry and physics faculty and returned by the end of the Fall 1997 semester. Individual interviews with these faculty were also conducted by the coordinator.

An end of semester student survey was developed by the MSTE central office and this was printed front to back and given to instructors two weeks prior to the end of the Fall 1997 semester. The coordinator collected these surveys within a week after the end of the semester and asked student workers to input the data on the World Wide Web. A
faculty survey (also developed by the MSTE office) was given to all full time faculty two
weeks prior to the end of the semester and these were collected and entered by student
workers on the Web (some faculty responded on the Web). Identification numbers for all
faculty were assigned by the MSTE office and these were e-mailed by the coordinator to
all full-time faculty (see Appendix).

At the end of finals week, scores on a set of six common core questions on all
college algebra final exams were collected from instructors. These core questions had
been developed by the transfer mathematics course academic assessment committee. A
set of five or six core questions was developed for each mathematics transfer course
offered at Parkland. The coordinator also collected a set of hour exams and final exams
from two college algebra instructors.

Over Christmas vacation break, the coordinator carried out a cognitive demand
analysis of homework problems assigned by instructors and recorded in the instructor
logbooks. The taxonomy used for this classification was similar to that used in the SIMS
study. The problems were classified as: Recall/Recognition, Understanding, Application,
and Discovery. A similar analysis was carried out on the hour exams and final exams
obtained from two college algebra instructors.

The coordinator along with the clerical assistance of a student worker wrote up a
summary of the case study results for presentation at the MAA meeting in Baltimore in

For the Spring 1998 semester, Parkland extended its case studies to include
College Algebra (MAT 124) and Calculus and Analytic Geometry I, II, III (MAT
128,129,228). A beginning of semester student survey was developed by the MSTE
central office and this was printed front to back and given to instructors at least one week
prior to the first day of class to give them enough time to plan their first day activities.
The surveys were collected over a two week period by the coordinator and student
workers input the data on the World Wide Web.

A department survey was developed by the MSTE central office and this was
filled out by James Hall, Chair of the Mathematical and Computer Sciences Department.
The completed survey was brought to the general project meeting held in February 1998
in San Marcos, CA.

The midterm student surveys, instructor logbooks, and the Peer Tutoring Lab
usage logbook were carried out for the case study courses as had been done previously
during the Fall 1997 semester. In addition, two independent observers, Teri Jo Murphy
and Curtis McKnight, attended several classes during the week of midterm to validate the
instructor logbook data. A MAT 228 class was also videotaped with an observer present.

In an effort to improve student retention in college algebra courses, the student
database was used to compile a list of all students who withdrew from MAT 124 during
the Fall 1997 semester. A follow-up questionnaire was developed (Appendix) and sent to
these students and their instructors. To save on mailing costs, the student database was
used to compile a list of those students who had enrolled in classes for the Spring 1998
semester and campus mail was used to send the students the questionnaires. The data
obtained from these questionnaires was to be used to determine a profile for the “at risk”
college algebra student.

One problem that occurred was that the instructors did not receive the follow-up
questionnaire until after midterm of the Spring 1998 semester and had difficulty
remembering all of the students from the previous semester. As a result, in subsequent semesters (Spring 1998, Fall 1998, and Spring 1999), the follow-up questionnaires were sent out to students and instructors during the first week of the subsequent semester.

In April 1998, the coordinator along with the clerical assistance of a student worker wrote up a summary of the case study results for the presentation at the IMACC meeting held at Allerton House near Monticello, Illinois. The faculty in attendance were particularly interested in results from the indicator study which could improve student retention in college algebra courses.

An end of semester student survey and a faculty survey had been revised at the February 1998 meeting and issued from the MSTE office. The student survey was again printed back to back and given to instructors two weeks prior to the end of the Spring 1998 semester. The coordinator collected these surveys within a week after the end of the semester and asked student workers to input the data on the World Wide Web. The faculty survey was given to all full time faculty two weeks prior to the end of the semester and some of these were collected and entered by student workers on the Web (some faculty responded directly on the Web.) The same faculty identification numbers were used from the Fall 1997 semester. Due to the large number of end of semester activities it was recommended by the faculty and coordinator to give out the faculty surveys at least three weeks prior to the end of the semester.

At the end of finals week, scores on sets of core questions on all final exams of the targeted case study courses were collected from instructors. The coordinator also collected a set of hour exams and final exams from six instructors teaching the targeted case study courses.

At the end of May 1998, the coordinator requested a REU supplement for the NSF Grant to provide funds to support undergraduates, to help carry out the taxonomy analysis of the assigned homework problems and hour exams and final exams given in the college algebra courses.

At the beginning of June 1998, follow-up questionnaires were sent out to students who had withdrawn from MAT 124 during the Spring 1998 semester as well as their instructors. During June and July 1998, the coordinator and two student workers continued to analyze the data that had been collected. Occasionally the coordinator would meet with the director of institutional research at Parkland to discuss different ways to make use of the student database to aid in this data analysis.

At the beginning of August 1998, a general meeting of all the project members from all three sites was held at UIUC. Parkland’s team met with their advisory group to discuss their data analysis as well as make plans for the Fall 1998 semester. The student and faculty surveys were again revised by the group. The use of focus groups and interviews was discussed to provide additional data for each site. Plans were also discussed for a presentation at a symposium at the Rose-Hulman Institute of Technology focusing on the assessment of engineering programs. Parkland planned to make a presentation about their work on the development of a client disciplines survey.

For the Fall 1998 semester Parkland continued their case studies of MAT 124, 128, 129, and 228. They extended their case studies to include Mathematics for Elementary Teachers I (MAT 105). A revised beginning of semester student survey was developed by the MSTE central office and this was printed front to back and given to instructors at least one week prior to the first day of class to give them enough time to
plan their first day activities. The surveys were collected over a two week period by the coordinator and student workers input the responses on the World Wide Web. During the Fall 1998 semester, several small meetings were held at the MSTE office at UIUC to discuss the taxonomy analysis of calculus (by the UIUC site) and college algebra (by the Parkland site) textbook exercises. With support from the REU supplement funds, two undergraduate mathematics majors from UIUC carried out the coding, according to a taxonomy scheme developed by the MSTE team of several of the commonly assigned textbook exercises from the textbook required for all of the sections of MAT 124 at Parkland. The results of this analysis are shown in Appendix.

At the beginning of October, plans were outlined by the coordinator and mathematics department chair for a focus group to be conducted by two independent observers, Curtis McKnight and Tim Hendrix. The group was to be composed of all full-time mathematics faculty and the topics to be discussed included College Algebra (MAT 124), the use of graphics calculators in instruction, and the role of the AMATYC standards in instruction. The department chair sent out an email to all full-time mathematics faculty informing them of the date and time of the focus group meeting scheduled for Nov. 3 (see Appendix).

In mid-October, the Parkland site coordinator gave a presentation about Parkland’s work on the development of a client disciplines survey at the Rose-Hulman Institute of Technology symposium focusing on the assessment of engineering programs. As part of the presentation, feedback was requested from the participants and those in attendance reviewed the client disciplines survey and wrote down suggestions on note cards. Two issues that were stressed by the group was the need for engineering students to understand mathematical modeling and the use of technology in problem solving.

After the Rose-Hulman symposium, the midterm student surveys, instructor logbooks, and the Peer Tutoring Lab usage logbook were carried out for the case study courses as had been done previously during the Fall 1997 and Spring 1998 semesters.

In early November, two independent observers, Curtis McKnight and Tim Hendrix attended several case study classes to validate the instructor logbook data. They also interviewed a full-time physics instructor at Parkland regarding the mathematics preparation of physics students in his courses, as part of Parkland’s client disciplines study. In addition, the two observers conducted and taped a focus group with the full-time mathematics faculty as described earlier. Also, an outside consultant, Skip Kifer, met with the coordinator and faculty chairs of mathematics academic assessment committees to discuss the development of surveys for academic assessment and scoring rubrics for the core questions given on final exams.

At the end of November, a revised department profile (survey) was developed by the MSTE central office and completed by James Hall, chair of the Mathematics and Computer Science Department, with the assistance of the coordinator. An end of the semester survey and a faculty survey had again been revised during the Fall 1998 semester and issued by the MSTE office. The student survey was again printed back to back and given to instructors two weeks prior to the end of the Fall 1998 semester. The coordinator collected these surveys within a week after the end of the semester and asked student workers to input the data on the World Wide Web. The faculty survey was given to all full-time faculty and, in addition, four part-time faculty (who were teaching case
study courses), two weeks prior to the end of the semester and some these were collected
and entered by student workers on the Web (some faculty responded directly on the
Web). The same faculty identification numbers were used from the Fall 1997 semesters
with additional numbers added for new full-time faculty. Overall, this data collection
process was identical to that carried out during the Fall 1997 and Spring 1998 semesters.

At the end of the finals week, scores on sets of core questions on all targeted case
study courses were again collected from instructors. The coordinator collected a set of
hour exams and final exams from three instructors teaching the targeted case study
courses.

Much of Spring 1999 was devoted to data analysis and interpretation. In February
1999, a general project meeting was held in Del Mar, CA. The Parkland team met with
their advisory group and discussed the analysis and interpretation of Parkland’s data and
how the data related to the sets of indicators which had been developed during the past
meetings and refined by the MSTE central office. A framework for the Parkland site
report was also developed in these discussions.

Summary of Data Collection Activities

The Parkland project team consists of three members:
Omar Adawi – Associate Professor of Mathematics, Director of Peer Tutoring – Project
Coordinator.
Dale Ewen – Vice President of Academic and Student Services – Project Team Leader.
James W. Hall – Chair of the Mathematical and Computer Sciences Department.

There were also three additional support personnel involved in the Parkland project:
Ben W. Shelton – Director of Campus Technologies – Data analysis
George H. Johnston – Director of Institutional Research and Development – Data
analysis
Linda L. Crowley – Secretary of the Mathematical and computer Sciences Department –
Clerical support

The advisory group for Parkland’s project team consisted of three faculty from
community colleges:
Stephen B. Rodi – Austin Community College
Janet P. Ray – Seattle Central Community College
Alan Jacobs – Maricopa Mathematics Consortium

Data collected by semester:

Sources of Data (Fall 1997): Parkland conducted a case study of College
Algebra (MAT 124). The data collected in Parkland’s case study includes: first-day,
midterm, and end-of-semester student surveys, instructors’ logbooks, faculty surveys,
math tutoring lab usage reports, tracking of students with our central student database,
and the availability of data for subsequent tracking of students as they transfer to other
colleges in Illinois.
Course in case study:

MAT 124 (12 sections, 7 instructors, 372 students enrolled)

1. First-Day Student Survey -- General student questionnaire given by all sites and data entered on the M.S.T.E. website (n = 335).
2. Midterm Student Survey -- General questionnaire filled out by students during the week of October 20, 1997 (n = 249).
3. End-of-Semester Student Survey -- General student questionnaire given by all sites and data entered on the M.S.T.E. website (n = 168).
4. Faculty Survey -- General faculty survey given by all sites and data entered on the M.S.T.E. website (n = 12).
5. Instructor Logbook -- Instructors described their classroom practices for the week of October 20, 1997 (n = 6). Independent observers attended several of the classes during this period to validate the logbook data.
6. Math Tutoring Lab Usage -- All students enrolled in the targeted case study courses that used the Peer Tutoring Lab during the week of October 20, 1997 were monitored and a brief description of the topic and type of questions asked was recorded in a logbook (n = 19).
7. Hour exams and final exams from instructors teaching the targeted case study courses (n = 2).
8. MAT 124 Follow-up questionnaires (n = 7 instructors, n = 61 students).
9. Scores on sets of common core questions on all targeted case study final exams given in Fall 1997.
10. Tracking of Students with Central Student Database.

Sources of Data (Spring 1998): Parkland extended their case studies to include College Algebra (MAT 124), Calculus and Analytic Geometry I, II, and III (MAT 128, 129, and 228). The data collected in Parkland’s case studies includes: first-day, midterm, and end-of-semester student surveys, instructors’ logbooks, faculty surveys, client discipline surveys, interviews, math tutoring lab usage reports, tracking of students with our central student database, and the availability of data for subsequent tracking of students as they transfer to other colleges in Illinois.

Courses in case study:

MAT 124 (10 sections, 5 instructors, 331 students enrolled)

MAT 128 (4 sections, 4 instructors, 122 students enrolled)

MAT 129 (3 sections, 3 instructors, 62 students enrolled)

MAT 228 (2 sections, 2 instructors, 58 students enrolled)
1. First-Day Student Survey -- General student questionnaire given by all sites and data entered on the M.S.T.E. website (n = 470).
2. Midterm Student Survey -- General questionnaire filled out by students during the week of March 5-11, 1998 (n = 374).
3. End-of-Semester Student Survey -- General student questionnaire given by all sites and data entered on the M.S.T.E. website (n = 252).
4. Faculty Survey -- General faculty survey given by all sites and data entered on the M.S.T.E. website (n = 12).
5. Instructor Logbook -- Instructors described their classroom practices for the week of March 5-11, 1998 (n = 12). Independent observers attended several of the classes during this period to validate the logbook data.
6. Math Tutoring Lab Usage -- All students enrolled in the targeted case study courses that used the Peer Tutoring Lab during the week of March 5-11, 1998 were monitored and a brief description of the topic and type of questions asked was recorded in a logbook (n = 51).
7. Client Discipline Survey -- Questionnaire filled out by Parkland faculty who teach introductory courses which require a mathematics prerequisite (such as physics and chemistry) (n = 6 chemistry and physics instructors).
8. Hour exams and final exams from instructors teaching the targeted case study courses (n = 6).
10. MAT 124 Follow-up questionnaires (n = 7 instructors, n = 35 students).
11. Scores on sets of common core questions on all targeted case study final exams given in Spring 1998.
12. Tracking of Students with Central Student Database.

Sources of Data (Fall 1998): Parkland continued their case studies of College Algebra (MAT 124), Calculus and Analytic Geometry I, II, and III (MAT 128, 129, and 228). They extended their case studies to include Mathematics for Elementary Teachers I (MAT 105). The data collected in Parkland’s case studies includes: first-day, midterm, and end-of-semester student surveys, instructors’ logbooks, faculty surveys, focus groups, interviews, math tutoring lab usage reports, tracking of students with our central student database, and the availability of data for subsequent tracking of students as they transfer to other colleges in Illinois.

Courses in case study:

MAT 105 (2 sections, 1 instructor, 44 students enrolled)
MAT 124 (11 sections, 6 instructors, 325 students enrolled)
MAT 128 (5 sections, 2 instructors, 140 students enrolled)
MAT 129 (3 sections, 3 instructors, 46 students enrolled)
MAT 228 (2 sections, 2 instructors, 46 students enrolled)
1. First-Day Student Survey -- General student questionnaire given by all sites and data entered on the M.S.T.E. website (n = 485).
3. End-of-Semester Student Survey -- General student questionnaire given by all sites and data entered on the M.S.T.E. website (n = 216).
4. Faculty Survey -- General faculty survey given by all sites and data entered on the M.S.T.E. website (n = 15).
5. Instructor Logbook -- Instructors described their classroom practices for the week of October 19-23, 1998 (n = 10). Independent observers attended several of the classes during this period to validate the logbook data.
6. Math Tutoring Lab Usage -- All students enrolled in the targeted case study courses that used the Peer Tutoring Lab during the week of October 19-23, 1998 were monitored and a brief description of the topic and type of questions asked was recorded in a logbook (n = 32).
7. Hour exams and final exams from instructors teaching the targeted case study courses (n = 3).
8. Department survey.
9. MAT 124 Follow-up questionnaires (n = 6 instructors, n = 54 students).
10. Interview -- A full-time physics instructor at Parkland was interviewed by two independent observers regarding the mathematics preparation of physics students in his courses.
10. Focus Group -- A focus group was conducted by two independent observers. The group was composed of all full-time mathematics faculty who discussed issues concerning College Algebra, the use of graphics calculators, and the AMATYC standards (n = 15 full-time faculty).
11. Scores on sets of common core questions on all targeted case study final exams given in Fall 1998.
12. Tracking of Students with Central Student Database.
Summary Timelines for Data Collection

Planning (At least one semester prior to the actual data collection and after budget funds are granted): Project site team is selected after discussions with the vice president of academic affairs and the chair of the mathematics department. Mathematics department faculty is informed of project and asked for input into goals and possible links to college-wide academic assessment. General meeting of all sites involved in project is held and advisory group is selected for each site. Site team and interested mathematics faculty meet with advisory group to formulate indicators and discuss data collection methods. Beginning of semester student survey is developed by site team and reviewed by mathematics faculty.

Week 0 (One week prior to the first day of classes): Hand out beginning of semester student surveys to all faculty teaching case study courses.
Week 1: Beginning of semester student surveys are completed by students in case study courses.
Week 2 and 3: Completed beginning of semester student surveys are collected.
Week 4: Beginning of semester student survey responses are entered on the Web.
Week 5: Midterm student surveys and instructor logbooks are created and printed up.
Week 6: Instructor logbooks and midterm student surveys are handed out to all faculty teaching case study courses.
Week 8: Midterm student surveys, instructor logbooks, and math tutoring lab usage logbook are completed by students and faculty.
Weeks 9 and 10: Completed midterm student surveys, instructor logbooks, and math tutoring lab usage logbook are collected.
Weeks 11 and 12: Data from midterm student surveys, instructor logbooks, and math tutoring lab usage logbook is analyzed and summarized in reports.
Week 13: Faculty surveys are handed out to all faculty teaching case study courses as well as to all full time faculty.
Week 14: End of semester student surveys are handed out to all faculty teaching case study courses.
Week 17 (Final Week): Completed end of semester student surveys and faculty surveys are collected. At the end of finals week, scores on sets of core questions on all final exams of the case study courses are collected from instructors. Sample sets of hour exams and final exams are also collected from faculty teaching the case study courses.
Week 18: Completed end of semester student survey and faculty survey responses are entered on the Web. Follow-up questionnaires regarding withdrawn students are handed out to all instructors who taught college algebra the past semester.

Two weeks after the beginning of the subsequent semester, follow-up questionnaires are sent to students who had withdrawn from college algebra the previous semester.
Courses Descriptions of Case Study Courses

MAT 124 College Algebra
Review of real number system, radicals, equations, and exponents; relations and functions; logarithms; systems of equations; matrix theory; linear, exponential and polynomial models; polynomials and theory of equations; complex numbers; sequences and series; binomial theorem and mathematical induction.

MAT 128 Calculus and Analytic Geometry I
Distance formula, straight line, functions; derivative and its applications; integral and its applications; limits and continuity; trigonometric, exponential, logarithmic, and hyperbolic functions.

MAT 129 Calculus and Analytic Geometry II
Conic sections, polar coordinates, methods of integration, applications of integration, parametric equations, indeterminate forms, infinite series.

MAT 228 Calculus and Analytic Geometry III and Introductory Matrix Theory
Systems of linear equations, matrices and inverses, determinants, vector spaces, eigenvalues and eigenvectors, solid analytic geometry, partial derivatives, parametric equations, multiple integrals, and line integrals.

MAT 105 Mathematics for Elementary Teachers I
Concepts and structures of real, rational, and integer numbers, sets, logic, probability, as well as development of numeration systems, problem-solving techniques, use of calculator for the elementary teacher.