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AUTHOR Catlin, Anita; Kalina, Michelle
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ABSTRACT

In 1992, eight two-year colleges in Northern California were chosen to participate in a quantitative study of the relationship between student outcomes and the use of instructional methods recommended in the Cross/Angelo Classroom Assessment Model. The model supports the modification of instruction based on frequent, quick, and anonymous written feedback from students about their understanding of course content and their reactions to instruction. The study compared retention, grade distribution, and classroom environment data for classes in which Classroom Assessment techniques were used and those in which they were not employed. Outcomes comparisons were also made by gender and ethnicity. A first research design compared student retention for the same instructor before and after the instructor received training in and implemented Classroom Assessment techniques. In a second design, trained instructors either utilized or withheld Classroom Assessment techniques with different sections of the same course. Pilot studies were first conducted in summer 1992, with larger studies conducted in fall 1992 and spring 1993. Study findings included the following: (1) retention rates for women in Classroom Assessment classes were higher than in control classes, though retention did not change for men; (2) grade point averages in Classroom Assessment classes were not significantly higher than in control classes, though there were a higher percentage of "A's" among Classroom Assessment students; and (3) minority students felt more positive about the classroom environment in Classroom Assessment classes than in control classes. A literature review; results of student and instructor surveys; recommendations; study letters and survey instruments; and a 52-item bibliography are included. (PAA)

RESEARCH REPORT

WHAT IS THE EFFECT OF THE CROSS/ANGELO MODEL OF CLASSROOM ASSESSMENT ON STUDENT OUTCOME?

A Study of The Classroom Assessment Project at Eight California Community Colleges

Anita Catlin, M.S.N., F.N.P.
Project Director

Michelle Kalina, Ed.D.
Research Coordinator

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TABLE OF CONTENTS

INDEX OF FIGURES, CHARTS AND GRAPHS

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CHAPTER ONE

THE PROBLEM

INTRODUCTION

Since 1988, Drs. K. Patricia Cross and Thomas A. Angelo have been writing, teaching and speaking about the Classroom Assessment Model throughout the United States and Canada. This model, which is based on the collection of frequent, quick and anonymous written feedback from students, has been embraced nationwide. Hundreds of instructors and thousands of students have been exposed to the model and have supported the premise that when the instructor and student enter into a "partnership" for learning, positive and improved outcomes occur. Teachers feel better about teaching and students feel better about learning. Several qualitative studies (Stetson, 1989, Kelly, 1992, Kelemen-Lohnas, 1993) have shown this to be so.

It has been harder, however, to gather quantitative data to demonstrate statistically that there is a positive relationship between use of classroom assessment techniques and measures of student outcome, such as grades or retention. After initial funding for dissemination of the model throughout the state, the California Community College Chancellor's Office funded this attempt to measure the effect of the use of the Cross/Angelo model techniques on student outcomes.

BACKGROUND

Eight California Community Colleges participated in this consortium research project. In 1991, the Chancellor's Office Grant supported dissemination training in the Cross/Angelo model at 17 Northern California colleges. In 1992, eight of these colleges were chosen to participate in the research study. Criteria used to choose the schools were continued school need for grant support to disseminate training, administrative commitment to the use of classroom assessment techniques by faculty in the classroom, and the perceived ability of the faculty leader to effectively train faculty and extend the model on each campus. The project director obtained signed agreements from college presidents and business office managers to accept Chancellor's Office funding in return for the training of faculty members at their colleges and the collection of research data about student outcomes in classes of those instructors who would be trained. Each participating college received $4,900 to pay for a leader of the project, a research assistant, faculty participant stipends, a communications modem and a small travel budget. The project director and research coordinator met with the Deans of Instruction, administrator assigned to the project, Director of Admissions and Records, project leader and designated research assistant at each school. Agreements to participate were obtained.

The research measures included comparison analysis of retention, grade distribution and classroom environment data for classes in which classroom assessment techniques were and were not used. There were two pilot testing trials, two small scale studies, and one large investigation conducted. It was anticipated that results and analysis of the data would assist colleges in the decision whether or not to fund classroom assessment programs by examining student outcomes.

Participating schools in this consortium research project were:

Napa Valley College
Sierra College
Cosumnes River College
Chabot College
Merced College
Skyline College
Butte College
Gavilan College

TERMINOLOGY

Clarification of common terminology in the Classroom Assessment field and in this document.

CLASSROOM ASSESSMENT

The process of using informal feedback techniques in which data is systematically gathered from students frequently and anonymously about their understanding of course content and reactions to instruction. Classroom Assessment could also include questions about student attitudes and background which may contribute to or impede their learning.

CATs

This abbreviation or acronym stands for "Classroom Assessment Techniques" or the actual small, continuous and anonymous assessment exercises done in the classroom.

SUMMATIVE ASSESSMENT

Often times called testing, summative assessment is usually done at the time instruction is completed or for purposes of grading. Summative assessment outcome, in the form of grades, is unchangeable.

FORMATIVE ASSESSMENT

Formative assessment is done while there is still time to change the outcome. When instructors use formative assessment prior to testing, there is still time for instructors to alter instruction to ensure that learning occurs. It "shapes" or "forms" learning while it is in progress.

CLASSROOM RESEARCH

Classroom Research is used to increase the teacher's understanding of the learning process. It differs from Classroom Assessment in that it usually tests a hypothesis or addresses a question--often one that arises from a Classroom Assessment. It capitalizes on teachers' knowledge of their disciplines and their students and does not require the knowledge of formal research design or statistical methods.

CLASSROOM

The place where an instructor meets and works with students and does assessments. This can be a classroom, clinical area or field placement.

FEEDBACK

The data gathered from students as a result of the assessment which is turned into helpful information for the instructor.

RETENTION

In this study, those students who receive any grade (A, B, C, D, F, I or C/NC) on the final grading report are considered to be retained. This does not include those who dropped the course with a "W." The percentage generated between the number of students enrolled at first census and those receiving grades is called retention.

MATCHED CLASSES

Matched classes were two sections of the same class taught by the same instructor at the same location at the same basic time. The two sections may have differed in year (pre and post instructor training in the model) or may have been taught simultaneously (after faculty were trained), depended upon the nature of the research design.

FEEDBACK CLASS

Class in which an instructor continuously, reliably and appropriately uses classroom assessment techniques.

NON-FEEDBACK CLASS

Class in which an instructor withholds the use of any written and anonymous classroom assessment techniques.

ADDITIONAL CONTROL GROUP

A second control group added to the study in response to the pilot testing. This group included fifteen classes of students whose eleven instructors had never been trained in the Cross/Angelo method.

CUCEI

The College and University Classroom Environment Instrument developed by Drs. David Treagust and Barry Fraser at the Curtin Institute of Technology in Western Australia.

ASSUMPTIONS

1. The Cross/Angelo Model of Classroom Assessment works well to increase student learning and student satisfaction with their learning experience.

2. The Cross/Angelo Model of Classroom Assessment works well to increase instructor satisfaction with the teaching process.

OBJECTIVES

The objective of this study was to examine the effect, if any, of classroom assessment on student outcome. It was an attempt to quantify student satisfaction and positive outcome which had been previously demonstrated mainly through qualitative measures. The questions asked were as follows:

1. Does the use of Classroom Assessment Techniques have an effect on retention?

2. Does the use of Classroom Assessment Techniques have an effect on final grades and grade distribution?

3. Does the use of Classroom Assessment Techniques have an effect on course completion by gender?

4. Does the use of Classroom Assessment Techniques have an effect on course completion by ethnicity?

5. Does the use of Classroom Assessment Techniques influence the classroom environment?

NULL HYPOTHESIS

The null hypothesis was that there would be no differences in measurements of student outcome (retention, grade point average and grade distribution, course completion by gender/ethnicity and the classroom environment) in courses where Classroom Assessment Techniques were used when compared to matched classes where Classroom Assessment Techniques were not used.

SCOPE AND LIMITATIONS

It is difficult in the community college system to analyze why some students persist and succeed and others drop out or fail. Socioeconomic level, family, and personal concerns certainly influence these outcomes. In this study, however, we examined only the effect of a certain teaching technique on outcome variables, and undoubtedly there were other variables influencing a student's success or non-success. This limitation was addressed by matching the control groups to the treatment groups as closely as possible, anticipating that extraneous variables influencing one group would influence the other group equally, and therefore be balanced out.

This study was an examination of student outcome in response to instructor use of a particular teaching model. Upon piloting our research methodology, several questions arose. Could we be sure that instructors in the study were correctly trained in use of the model? Could we depend upon the fact that they were using the teaching techniques continuously, reliably and appropriately? Could we be sure that the techniques were being withheld in the control group classes, and that there was no crossover of information from the CATs classes to the control group classes? As time passed, we learned to be clearer and clearer in our directions to participating instructors. Uncertainty about instructor compliance to the research design was an initial limitation, and certainly influenced portions of the CUCEI classroom environment instrument pilot test results.

An unanticipated serious limitation was instructor reluctance to withhold the Classroom Assessment Techniques in their classrooms. So convinced were participants in the effectiveness of the model that in several cases instructors were unwilling to finish the study due to ethical concerns. This prevented the inclusion of all eight schools into every portion of the study.

Another limitation of the study was frequent difficulty in obtaining enrollment and completion data from the admissions and records departments at the participating colleges. The lack of timely and easy access to data by means of computer call up attests to the limitation that exists in California in 1993 with no easy data base access to student records in many community colleges. At some schools records had to be hand pulled and data taken from instructor roster due either to a very long time lag before records such as final grades were entered into the college information system or unanticipated early deletion of first census data entry into the system.

The inclusion of one college that operated on the quarter system with seven colleges on the semester system proved to be a greater problem than originally foreseen. That school's data was, in some instances, not able to be included in the analysis due to project schedule time constraints.

The size of the study was limited by the funding available. Originally written to study seventeen schools in both Northern and Southern California, when funded, financial support was sufficient to include only eight schools, all located in Northern California.

An attempt was made to include as diverse a population as possible, choosing both rural and urban schools with both large and small student populations. Six to eight instructors from each school participated in the research project. It is possible that the results obtained might be similar throughout other schools in the California Community College system.

CHAPTER TWO

REVIEW OF THE LITERATURE

WHAT IS THE CROSS/ANGELO MODEL?

Classroom Assessment, as developed by Drs. K. Patricia Cross and Thomas A. Angelo, is a procedure which consists of doing small-scale assessments continuously (and anonymously) in college classrooms by discipline based teachers to determine what students are learning in that class (Cross, 1989). By using this method, the traditional "instructor in front of the class" lecture process changes to a dynamic partnership where both parties direct the pathway to knowledge acquisition. Initially, faculty are prone to confuse Classroom Assessment Techniques (CATs) with the tests and quizzes they use to evaluate student learning. Unlike tests and quizzes, however, CATs are ungraded and anonymous. The purpose of doing CATs is to quickly assess learning in order to adjust instruction, not to evaluate achievement. CATs are usually done on 3X5 cards which are passed out either before, during or after class, on which students answer instructor generated questions. The primary purpose of Classroom Assessment is to improve learning directly, by providing teachers with the kind of feedback they need to make informed instructional decisions (Angelo, 1991).

Despite the fact that all good teachers elicit feedback and use the responses informally, very few do so systematically and regularly enough to use that feedback to help students improve the quality of their learning. First, in informal data gathering, only a brave few may be willing to give an instructor feedback. Shy students, those whose culture teaches that questioning authority is undesirable or those students whose mastery of the spoken language is limited, would be hesitant to give oral or public feedback.

Classroom Assessment Techniques offer faculty the opportunity to discover not just whether students are learning, or what they are learning, but how they learn and how well they learn in response to how we teach, and they give faculty the opportunity to find these things out in time to help students immediately (Kort, 1991). Although many college faculty are well-trained experts in their fields of study, they often have little or no formal training or experience in systematically studying student learning (Angelo, 1991). What keeps many (instructors) from being more effective teachers is not a lack of wanting but of not knowing quite how to do it (Katz, 1987). Classroom Assessment is an effective assessment model because it occurs as close as possible to the scene of action in teaching and learning (the classroom) and provides diagnostic feedback to both teachers and students--to teachers on how they can improve their teaching, to students on how they can improve their learning (Cross, 1988).

The Classroom Assessment Model as developed by Cross and Angelo has been presented, studied and taught to faculty and administrators throughout the United States and Canada (Cross and Angelo, 1993). Faculty and student acceptance of the model was immediate. People began to write about the use of the Classroom

Assessment Techniques as developed by Cross and Angelo and to conduct research studies on the application and results of applying the model. This research study attempts to examine the effects of the Cross/Angelo model on student outcomes by examining areas previously researched, such as retention and grades, and by introducing another area of research, that of the classroom environment. A literature review of related research on classroom assessment and classroom environment will follow.

CLASSROOM ASSESSMENT RESEARCH

The Classroom Assessment Model has roots that may be traced to a number of learning theories. For purposes of this research, two conceptual frameworks were used. One was Bloom's model of alterable classroom variables (1980), and the second was Lewin's (1936) field theory. Bloom's work with the notion of formative assessment provides a backdrop to the work of Cross and Angelo. Bloom (1980) states" Formative tests are used primarily as feedback, to inform the student about what he has learned well and what he still needs to learn. When feedback is provided in relation to corrective procedures to help the student correct the learning, then with additional time and help most students do reach the standard of achievement set by the teacher."

Wilson (1986) was a researcher who also reported some of the first work done with feedback in the classroom. Wilson reported that a physics professor who was known as a "good instructor" wanted to know answers to two questions at the end of each lecture. Basically, they were: What the student thought the key point of a lecture was? And, what the student wanted to know more about? He planned to ask students these questions 4 or 5 times during the course of the semester.

Cross, in working with faculty from a variety of New England colleges and universities, cited Wilson's work as an example of student feedback and interested one faculty member in implementing an early version of what today is called Classroom Assessment Techniques (Mosteller, 1989).

Mosteller (1989), attracted to the notion of student feedback, began to ask students to respond to one question at the end of each lecture. He asked: "What key point did the lecture cover?" He later added a second question to the feedback: "What then would you like to know more about?" He summarized the feedback, did frequency distributions, distributed them to his students, then asked his students how they liked the feedback process. Student responses indicated that the process "gave them a quick opportunity to integrate the lecture at the end of the hour" and they regarded this as beneficial. However, they added that the professor wasn't really getting the feedback that he needed about lingering student questions as he had already supplied students with the key points of the lecture. Thus, as a result of this feedback, the "muddiest point" feedback mechanism came into existence. Mosteller

changed his classroom question to ask students for the "muddiest point" in the lecture, and the feedback from this question led to what students still needed to know more about.

Mosteller's study is considered a precursor of the Cross-Angelo model. It was developed using the notion of formative assessment by instructors to effect outcomes in their classrooms. The model suggests that when instructors have a means to assess how students are doing in a class prior to a test situation, the data obtained allows instructors to alter instruction to insure that learning occurs. This type of assessment is called formative assessment as it is done while there is still time to change the outcome. Summative assessment, oftentimes called a test, is usually done at the time instruction is completed for a particular unit and the instructional outcome for the material may not be changed.

Buckheister (1989) looked at institutional effectiveness issues for faculty in relation to the Cross-Angelo Classroom Assessment Model. She stated that this was a method that could be employed to improve student learning as "the quality of learning depends directly on the quality of teaching...," and that student feedback should improve the quality of teaching if the faculty member were open to critique.

Angelo (1990) suggests that classroom assessment is part of the larger arena known as classroom research. He states that if the quality of higher education is to improve, college faculty will need to become better skilled at assessing student learning in their own classroom and suggests that classroom assessment and research following feedback from classroom assessment is one way for faculty to do this.

Cuevas (1991) surveyed faculty and administration who had participated in a classroom feedback course based on the Cross-Angelo model at Miami Dade Community College in conjunction with the University of Miami. He found that a random sample of those who participated in the course felt the model would be a beneficial one to use in a classroom situation. He also suggests that classroom assessment allows instructors to align what they teach with what they are assessing (Cohen, 1987). Given feedback from students, instructors, in follow-up sessions, can match what they present with what students say they need. Cuevas (1991) suggests that faculty need to be taught: How to use Classroom Assessment Techniques; how to modify instruction to match feedback; how to teach the necessary study/learning techniques students need to use; the difference between formative and summative assessment; and, that the institution needs to support faculty endeavors in this arena by acknowledging their efforts with either stipends or release time.

Civikly (1992) looks at the issue of the relationship between teacher clarity and student outcomes, and states that there is a positive relationship between the two. Students in his study felt that the clearer an instructor was, the more positive was their perceptions of teaching effectiveness. "Teacher clarity was correlated positively with college students' positive judgments about their classes, attitudes about the instructor, and willingness to engage in the behaviors taught in class (Civikly, 1992)." This research supports Cross and Angelo's work, in which student feedback leads the instructor to which topics taught still need clarification.

In the past few years, researchers who believe in the Cross/Angelo model's effectiveness have tried to examine the model's effects on student outcomes. Using instructor application of CATs as the independent variable, the dependent variables most often studied have been student retention and grades. As part of program review at the College of Marin in California, the school examined retention and student grades in relation to instructor use of the model. College of Marin reported that they could not substantiate grade point differences in the use of the model, nor increases in retention. What was found was that faculty felt the process had improved instruction, had improved their relationships with students, and had improved their relationships with other faculty (Office of Staff and Organizational Development, College of Marin, 1990).

The concept of instructor satisfaction with the model was also a major finding in the report of Eve Keleman-Lohnas in the FIPSE Grant Report (1993). Keleman-Lohnas reviewed hundreds of instructor summaries after training and use of the Cross/Angelo model. Instructors consistently reported "change in their teaching techniques, a new insight into the teaching/learning process, and increased professional growth." Instructors felt that their students became better listeners and learners who came better prepared for class. Faculty also reported that using the goal matching exercise led to improved student placement and increased student referrals to appropriate campus resources. Instructors were satisfied with using CATs in the classroom; they felt much closer with students and they felt especially positive about the opportunity to sit and talk with fellow faculty about teaching as part of the training (Keleman-Lohnas, 1993).

In a study done by Obler, Arnold, Sigala, and Umbdenstock (1991), it was found that faculty universally commented that the best part of the classroom assessment training was the opportunity to talk with their colleagues. They cite the use of CATs by faculty as "recharging the batteries" of even the most experienced teachers. These researchers found that students, too, expressed satisfaction with the CATs process.

Kelemen-Lohnas also collected data from students. In her study, students described increases in m. 'vation, sense of participation, satisfaction, and enjoyment of learning. They described an increase in student-faculty rapport, and satisfaction with the partnership process (Kelemen-Lohnas, 1993).

Stetson (1989) tried to demonstrate quantifiable effects of the model using retention. She was able to demonstrate a slight effect on retention. This slight positive effect on retention was further substantiated by Obler, Arnold, Sigala, and Umbdenstock (1991) with a diverse student population. Kelly (1992) looked at use of CATs feedback effect on retention for adult students, and she, too, found slight effect on retention.

In a recent speech given by Thomas A. Angelo (June, 1993), he reports on general trends in research findings that examine the effect of classroom assessment on faculty and learners. These were:

1. There seems to be a change in faculty behavior.
2. Student retention either stays the same or is slightly increased.
3. Classroom assessment does not seem to harm students, and in some cases, classroom assessment may improve what is going on in the classroom.

Because both students and instructors have often been cited as enjoying the use of the model in the classroom, literature was then reviewed that examines classroom environment as it relates to classroom assessment.

CLASSROOM ENVIRONMENT RESEARCH

The literature was reviewed to look for instruments that might be used to measure classroom environment. The work of Treagust and Fraser (1986) was found. These professors created The College and University Environment Inventory (CUCEI), an instrument which was developed after an extensive review of all contributing literature regarding classroom environment and it's influence on student outcomes.

Treagust and Fraser cited the influence of Chavez's work on the development of their inventory. Chavez, in 1984, did a meta-analysis of all studies which connect different type of leadership roles and the "concomitant group climates." He cites a study by Lippitt in 1940, with an adolescent male population, in which Lippitt concluded that "different leadership styles produced different social climates and resulted in different group and individual behaviors." Chavez cites other studies in the 1940's (Anderson and Brewer, 1945, and Anderson, Brewer, and Reed, 1946) which then extended this research to include the effects of teachers' personalities on students' behavior. A significant contribution made by these researchers was the identification of two classes of teacher behaviors: 1) "socially integrative behavior which promoted 'the interplay of differences' in a classroom and permitted original thinking to occur" and 2) "socially dominative behavior which was characterized by a rigidity or inflexibility of purpose, an unwillingness to admit the contribution of another's experience, desires, purposes, or judgment." Chavez cites Withall (1949), who found that different teachers with the same students could change the classroom climate.

Chavez also relates the development in the 1960's of an instrument known as the Observation Schedule and Record, the OScAR (Medley and Mitzel). This instrument had 14 response keys and 3 scales (emotional climate, verbal emphasis, and social organization). The research conducted by Medley and Mitzel using the OScAR found that a classroom's emotional climate was an important dimension in classroom research.

Chavez cites several other instruments that were developed over the years to measure classroom environment. These included the College Characteristics Index (CCI), the High School Characteristics Index (HSCI), the Evening College Characteristics Index (ECCI), and the Organizational Climate Index (OCI). All four were similar in that they asked students to respond to true and false questions about aspects of environment in colleges, high schools, and evening college settings.

Treagust and Fraser attribute the development of their work to that of Trickett and Moos (1970), who developed a Classroom Environment Scale (CES) that looked at nine scales each containing 10 questions each. The nine scales were involvement, affiliation, support, task orientation, competition, order and organization, rule clarity, teacher control, and innovation. They found that these scales were able to reliably measure different types of interactions that occur in classroom setting. In 1973, a further study by Trickett and Moos found that the CES was able to discriminate between environmental factors that were different in different classrooms.

Moos and Moos (1978) used the CES to further investigate the relationships among the following variables: classroom environments, grades, and absenteeism and found that there was a relationship between a stringent grading policy and increased student absences. There were also strong relationships between student and teacher perceptions of class environments and mean grades. They concluded that a competitive environment may have a positive effect on student grades but result in more absences for a large group of students. Additionally, since absenteeism is related to poorer grades and subsequent drops, a competitive environment may benefit a few students at the expense of other students.

Concurrent with the work described above, two other inventories were developed, the Learning Environment Inventory (LEI) and the My Class Inventory (MCI). The MCI was used with elementary and junior high school students (Chavez, 1984).

The Learning Environment Inventory (LEI) was developed in the late sixties by Walberg. The LEI was originally designed with 14 scales and then added a fifteenth scale. These scales are: cohesiveness, diversity, formality, speed, environment, friction, goal direction, favoritism, cliqueness, satisfaction, disorganization, difficulty, apathy, democraticness, and competitiveness.

The various studies done with the LEI (Walberg and Anderson, 1968; Walberg, 1969a; Walberg, 1969b; Anderson et.al, 1969; O'Reilly, 1975; Randhawa & Michayluk, 1975) all found that a relationship existed between classroom environments and student outcomes.

Fraser (1978) used a modified version of the LEI with junior high school students. He found that the inventory could indicate differences in student perception about the classroom environment. It could also predict student outcomes in both the affective and cognitive domains.

The College and University Classroom Environment Inventory (CUCEI) was an outgrowth of the LCI and was developed to measure the environments in college seminar classes. The CUCEI evaluates students' perceptions of seven psychological dimensions of actual or preferred classroom environments. The scales are: Personalization, Involvement, Student Cohesiveness, Satisfaction, Task Orientation, Innovation, and Individualization. The CUCEI was found to be a reliable measure of classroom environment both in four-year institutions and alternative high schools (Williamson et al., 1986) in Australia.

Research findings using this instrument suggest that classroom environments have an effect on student outcomes. Treagust and Fraser (1986) found that there was a strong relationship between classroom environment and student learning as measured by post-test scores.

Bloom (1980) reported new methods of evaluating what is going on in classrooms and suggested that classroom environments play a role in student outcomes. He states that the "qualities of teaching that have a direct causal relation with student learning in the classroom."

Cross (1990) and Angelo (1990) suggest that use of Classroom Assessment Techniques is a methodology which gives instructors information about student perceptions of the classroom environment. Dependent upon classroom feedback techniques used, instructors can informally assess how students feel about specific cognitive and affective issues.

One consistent outcome of classroom environment studies is the relationship between students' sense of cohesiveness and retention and achievement in the classroom. Uri Treisman's 1985 work documented the effects of group cohesiveness on student outcomes. Triesman saw that Black students in Math 1A classes were not doing as well as other minority students, in particular Asian students. Through a comprehensive study of the two groups, which included researchers going home and living with the students (Triesman, 1992), he was able to isolate one variable that seemed to differentiate between the two groups. Asian students tended to study together in a group and contribute to each other's success in the class. Black students tended to study by themselves, and when confronted by a problem that seemed unsolvable, had no one to go to for help; leading to unfinished or incorrect homework, a sense of isolation, poor self image, and an eventual drop out or failure of the class. While the study groups served the Asian population both academically and socially, the Black students did not benefit from this type of support.

As a result of these findings, Treisman began his Study Group Project, which resulted in Black students doing as well as or better than the rest of the class. Effect sizes (for final grade earned) for black students participating in the workshops were 1.18 in the 1982 school year and .916 in 1983 when compared to Black students not in study groups. Triesman's project of study groups for minority students had three goals:

- Achieve mastery of the work;
- Identify early problems and work with students to alleviate problems before they became insurmountable; and
- Help students develop skills and resources that will enable them to excel in sophomore and upper-division mathematics and science courses without the continued help of the project.

This development of a classroom cohesiveness and feelings of companionship in the classroom was thought by the researchers to go along with the use of Cross/Angelo CATs which allow the instructor to collect student feelings about the class, share them with the class, and move together as a class to accomplish learning.

ADDITIONAL RESEARCH ON CLASSROOM ASSESSMENT INFLUENCE ON DIVERSITY AND GENDER

K. Patricia Cross, one of the originator's of the Cross/Angelo model, has talked about the student population that we teach in community colleges:

> Community colleges are the leading institutions in the hierarchy of higher education in serving more minorities, more part-time students, more adults, more blue- and pink-collar workers, more of the elderly, more single parents, and more displaced workers than any other segment of higher education. In short, every so-called "non-traditional" segment of society that was under-represented in higher education in 1950 is over-represented in community colleges today.

The growth of minority enrollment in community colleges was recently discussed by the American Association of Higher Education in their report Minorities in Higher Education (Carter and Wilson, 1993). They state that there has been slight to moderate gains in college enrollment by minority students for the period 1990-1992 with most of these gains occurring at the community college level. There was a 13.4 percent gain at community colleges compared to a 5.9 percent increase at four-year institutions.

To address the needs of diverse students, Cross suggests that classroom teachers become classroom researchers to systematically assess student learning, and, more specifically, to assess how students are responding to our efforts to teach them (1991). Cross further suggests that community colleges are good places to study diversity issues and needs as the community college structure welcomes a greater proportion of such a diverse population than do other segments of higher education (Cross,1991, AAHE, 1993).

Hart (1992) addresses some of the questions raised by Cross when he looks at the diverse cultural and racial identities and needs of (multicultural) students and suggests that "students and the institution must make changes to create a mutually satisfactory environment" for learning. He proposes a seven step methodology to move toward an environment that serves more diverse needs. These steps are:

1. Select educational values.
2. Translate values into specific goals.
3. Design environments that contain mechanisms to reach stated goals.
4. Make sure environments are fitted to diverse student needs.
5. Measure student perceptions of the environment.
6. Monitor student behavior resulting from their perceptions of the environment.
7. Gather student feedback on the environment from student behavior and perceptions, then reassess and modify where necessary.

A study done by Obler, Arnold, Sigala, and Um'bdenstock (1991) reflects both the model described by Hart and the work of Uri Triesman. Four principles directed their work on increasing respect for diversity in classrooms at community colleges:

1. Create a Pro-Diversity Curriculum defined as "increase(d) student awareness, skill, and applications of course content to a diverse, multicultural society.
2. Treat students as capable but inexperienced adult learners.
3. Promote cooperative learning.
4. Use classroom assessment.

Obler et.al. were concerned with both Pro-Diversity goals and Anti-Bias. Anti-Bias is defined as "challenging the prejudice stereotyping, and subtle or obvious biases in teaching methods or classroom resources." What this means in terms of teaching is that a conscious effort is made to eliminate negative references to groups and/or cultures and additionally, to help students identify such overt or subtle biases in material that they encounter. What these authors found was that both students and faculty were happy with subsequent changes made in curriculum. When students were assessed using Cross/Angelo Classroom Assessment Techniques, the feedback revealed positive student comments relevant to the new curriculum and teaching process employed. Students also gave feedback that they appreciated the cooperative learning aspects of the classes, as they felt that getting input from many diverse views was a very valuable part of their learning process. Faculty commented that they were impressed with the project and that students benefitted from attempts to include more diverse views in the curriculum. Obler also reports retention improved in classes where these principles were employed.

The text Minorities on Campus: A Handbook for Enhancing Diversity (Green, 1989) states that effective teaching that enhances learning for minority students includes "active involvement, frequent feedback, and understanding different ways of learning." The classroom assessment method meets these criteria.

Theobald-Osborne (1991) studied adult learners and predictor variables for success. She found that "Faculty interaction was the greatest predictor of positive educational outcomes for adult students." The classroom assessment process of faculty asking for student feedback and then sharing with them the results is an interaction considered strongly positive by faculty and students both.

A study recently released by the American Association of University Women called How Schools Shortchange Girls also echoes these sentiments. "Support from teachers can make a big difference. Studies report that girls rate teacher support as an important factor in decisions to pursue scientific and technological careers." Recommended actions for change to improve the success of women in higher education include the following statements:

> School-improvement efforts must include a focus on the ongoing professional development of teachers ...Support and released time must be provided by school districts for teacher-initiated research on curricula and classroom variables that affect student learning. Gender equity should be the focus of this research and a criterion for awarding funds.

The research conducted to examine the effect of the Cross/Angelo Classroom Assessment Model on student outcome may show that the model helps women students to succeed.

CHAPTER THREE

METHODOLOGY

RESEARCH DESIGN

In this study, six student outcome variables were examined. This was accomplished by means of two designs, each of which was piloted, done on a small scale, and then incorporated into one large inclusive research design. In all cases, data was analyzed by grouping all eight colleges, and no individual students or instructors were identified.

The first experimental model was a **time series design** or **pre-experimental**, one in which data was gathered on groups of students pre and post the instructor's training in the Cross/Angelo model. Classes were matched for same instructor, same subject, same course code, same time of day, but during different semesters. See Figure 1 below:

PRE AND POST RETENTION DATA STUDY

AN INSTRUCTOR IS ENROLLED IN THE CROSS/ANGELO CLASSROOM ASSESSMENT TRAINING COURSE AT ONE OF THE EIGHT COMMUNITY COLLEGES IN THE STUDY.
THIS PERSON IS ATTENDING THE SESSIONS AND HAS A GOOD GRASP OF THE MODEL. S/HE DESIGNATES A PARTICULAR COURSE IN WHICH S/HE USES FEEDBACK TECHNIQUES.
IN THIS DESIGNATED CLASS, S/HE USES THE TECHNIQUES CONSISTENTLY, CONTINUOUSLY, AND APPROPRIATELY.
RETENTION DATA IS THEN PULLED FOR THIS SAME COURSE TAUGHT BY THE SAME INSTRUCTOR IN THE SAME LOCATION AT APPROXIMATELY THE SAME TIME, ONE YEAR OR ONE SEMESTER PRIOR.
AS INSTRUCTOR WHO IS IN TRAINING FINISHES THE CLASS, THE SAME RETENTION DATA IS PULLED FOR THIS COURSE IN WHICH THE INSTRUCTOR HAS USED THE FEEDBACK TECHNIQUES, APPROXIMATELY ONE YEAR AFTER THE FIRST SET.
A COMPARISON IS MADE FOR RETENTION AND/OR GRADE STATISTICS PRE AND POST CLASSROOM ASSESSMENT TRAINING.

The second design used was **quasi-experimental**; one in which different groups were exposed to different treatment, but the groups were preexisting, and the differences in the groups were based on the existence of an independent variable. The independent variable here was student exposure to the use or non-use of the Cross/Angelo Classroom Assessment Techniques in their classes. Data was gathered on students in matched classes in which the instructor was either using or withholding the Classroom Assessment Techniques. See Figure 2 below:

MATCHED CLASS STUDY
INSTRUCTORS HAVE BEEN TRAINED IN THE CLASSROOM ASSESSMENT MODEL

ONE SECTION USES FEEDBACK TECHNIQUES	ONE SECTION WITHHOLDS FEEDBACK TECHNIQUES
SAME COURSE SAME INSTRUCTOR SAME BASIC TIME SAME SEMESTER	SAME COURSE SAME INSTRUCTOR SAME BASIC TIME SAME SEMESTER
CLASSROOM ENVIRONMENT INVENTORY USED TO SURVEY STUDENTS ON TENTH WEEK	CLASSROOM ENVIRONMENT INVENTORY USED TO SURVEY STUDENTS ON TENTH WEEK
COMPLETE RETENTION DATA IS COLLECTED 1ST CENSUS ENROLLMENT END OF TERM ENROLLMENT GPA GRADE DISTRIBUTION ETHNICITY AND GENDER INSTRUCTOR OPINION IS COLLECTED	COMPLETE RETENTION DATA IS COLLECTED 1ST CENSUS ENROLLMENT END OF TERM ENROLLMENT GPA GRADE DISTRIBUTION ETHNICITY AND GENDER INSTRUCTOR OPINION IS COLLECTED

MEASUREMENT AND INSTRUMENT SELECTION

In the two research designs, a total of six different measurements of student outcome were used. Each measurement will be described.

Retention studies were carried out by matching first census enrollment with end of term enrollment and obtaining the percentage of students remaining in the class.

Grade point average was obtained by adding together the point values of all the grades distributed in a class (A=4, B=3, C=2, D=1, F=0, Cr=2, No Cr=0) and dividing by the number of students receiving a grade.

Grade distribution was calculated by counting up how many of each grade was given in a class (number of A's, B's, C's, D's, F's, Cr, No Cr's and Inc.'s) and reporting the total grade distribution.

Retention by Ethnicity was calculated by identifying the ethnicity of each student enrolled at first census, counting how many of each ethnic group were enrolled (categories were Asian/Pacific Islanders, Alaskan/Native Americans, Black, White, Hispanic, Filipino, Other and No Answer) and comparing this to the percentages still enrolled at end of term. As this study had small numbers of some of the minorities listed here, a decision was made to compile all students categorized as Asian/Pacific Islanders, Alaskan/Native Americans, Black, Hispanic, Filipino, Other and No Answer into a category called New Majority and to report the data in this manner.

Retention by Gender was calculated by identifying each enrolled student's gender at first census and comparing this to the percentages of men and women still enrolled at end of term.

Classroom Environment was measured by using the CUCEI instrument (College and University Classroom Environment Inventory) developed by Treaquest and Fraser in 1988 in Western Australia. This is a 49 question survey which asks students their opinions of the class environment. The instrument was found to be valid and reliable when used in technical schools in Australia and at universities in the United States. This was the CUCEI survey's first use in American community colleges. The CUCEI instrument has a possible score of 1-5 points for each of the 49 questions. The lowest score (1) is the most desirable classroom environment choice. There are seven subscales which are groups of seven questions each which are contained in the categories of classroom Personalization, Involvement, Cohesiveness, Satisfaction, Task, Innovation, and Individualization. Treagust and Fraser (1986) defined these terms as follows:

- Individualization is the extent to which students are allowed to make decisions and are treated differently according to ability, interest, or rate of working.
- Innovation is the extent to which an instructor uses new and unusual teaching techniques, activities and assignments.

- Involvement is the extent to which students participate in class.
- Personalization is an individual student's opportunity to interact with the instructor around personal welfare issues.
- Satisfaction is the extent to which a student enjoys a class.
- Student Cohesiveness is the extent to which students know, help and are friendly toward each other.
- Task Orientation is the extent to which class activities are well organized and clear.

During the year that this research study was being conducted, it was also the responsibility of the authors to supervise the Cross/Angelo training program at the eight colleges. Upon completion of the training, a survey form was distributed to all the participating instructors. Instructors were asked to anonymously answer the following questions:

1. Was the training a good use of your time?
2. Were you able to meet new instructors on your campus and develop a sense of collegiality that might not have occurred otherwise?
3. Do you think that asking students for feedback makes you a better teacher?
4. How did your students respond to being asked for their feedback?
5. What was your best experience with Classroom Assessment in your classes?
6. Were there any negative experiences?
7. Do you think that Classroom Assessment can help women and minority students succeed in classes that they might otherwise have dropped or failed?
8. Do you think that this program should be continued at your school?
9. Is there anything that you can do to support the continuation of this program?

Additional Comments:

SELECTION OF SUBJECTS

For the retention study pilot in Summer, 1992, three schools participated. The project leaders at these three schools randomly selected four instructors per school that had been trained in the Cross/Angelo Classroom Assessment Training during the previous school year. Random selection was done by putting the names of those who had completed the training in 1991-1992 in a hat, and selecting four instructors by pulling four names out, one at a time, with all the other names returned to the hat on each draw. The class in which each instructor had used classroom assessment techniques during the 1991-1992 school year was identified. First Census Enrollment and End of Term grade sheet records were obtained for that class and for a matched class (same time, same course, one year or one semester earlier, prior to Cross/Angelo training.) Twelve instructors' retention data were examined in this pilot study.

For the Fall, 1992 retention studies, once again random selection was used to identify two instructors per college who were currently enrolled in Cross/Angelo training. Data was collected for these instructors for the identified class that they were currently teaching and using CATs in, and for a matched class one semester to one year prior. Twelve instructors representing six colleges participated in this study.

For the Fall, 1992 matched class pilot studies in which an instructor was used as his/her own control, i.e., s/he used techniques in one class and withheld techniques in a matched class, the sample was taken from volunteers. Instructors to participate were found through personal contact or by notice in the college newsletter. It was not difficult to find volunteers who had two sections of the same course who had been trained in classroom assessment, but it was quite difficult to find such instructors who were willing to withhold the CATs from their second class. Even those who did agree to be subjects in the study had significant problems in this area, which will be discussed further in the pilot study report. Thirteen instructors from six colleges began the study, eleven completed it.

In Fall of 1992, it was decided to add an additional control group of instructors who had never been trained in the Cross/Angelo method and who were not using CATs in their classrooms. Fifteen additional classes of eleven such instructors were surveyed at one college. An attempt was made to survey a variety of disciplines, and these fifteen classes consisted of Humanities, English Composition, Film Technology, Computer Science, Physics, Viticulture, Color and Design, Painting, Chemistry, Business and Psychology.

In the final research design, in Spring, 1993, once again the sample consisted of volunteer instructors who were willing to teach one section of the same course using CATs and one section of the course withholding CATs. Initially two instructors from six schools and three instructors from two schools began the study, for a total of 18 matched classes. Matched class data was used for fifteen of these instructors.

For the additional instructor survey study, the project directors at the eight colleges were given ten surveys to distribute to faculty who had been trained in the Cross/Angelo method during the 1992-1993 school year.

In some cases, all eight schools are not represented in each study. Reasons that this occurred include:

1. Instructor moved away during study.
2. Instructor had class canceled.
3. Designated research director did not follow protocol instructions or missed data submission deadlines.
4. Instructor desired to drop out of study due to ethical concerns of not wanting to withhold the CATs techniques.
5. Instructor was unable to demonstrate consistent and reliable use of the CATs techniques in classroom.

CONCERN FOR THE RIGHTS OF HUMAN SUBJECTS

Various measures were used to assure the protection of human subjects. Any records pulled were entered anonymously into the computer. No names of students or instructors were included (see letter to admissions and records, page 63). Students answering the CUCEI inventory questions did so anonymously with no indication of their names or those of their instructors. Students were given the choice of participating or not participating in the data collection (see informed consent on page 65). Records were kept locked in the home of the researcher and no one else had access to the data. Post Hoc data collected from Admissions and Records departments was done without instructor or student names attached (Addendum, page 64). All instructors whose classes were used in the study gave their consent to participate. The data was analyzed by school and by group and could not be separated to identify individual classes, instructors or students. In all cases, schools were designated as "School 1-8" and will be referred to as such in the reporting.

CHAPTER FOUR

PILOT STUDIES

PILOT TESTING

Each of the eight schools had an assigned paid project director and paid research assistant. Meetings and correspondences took place regularly throughout the project year. Directions for the research protocol were given in person, in writing and on audio tape. In response to problems identified during the pilot testing, additional directions included a signed contract, a wall poster and more personal meetings with the participating instructors and research data collectors.

RETENTION STUDIES, PRE AND POST ASSESSMENT TRAINING

During the summer of 1992, retention data was collected at three colleges for a total of 12 instructors. The pilot was done ex post facto, by looking at previously compiled data from the admissions and records departments at three colleges. These records were used for a Pre and Post Training Study, in which Cross/Angelo trained instructors' end of term retention statistics were compared for the same class at the same time by the same instructor in the same location one year prior to training. In this pilot study, results indicated an increase from 80% end of term retention pre model training to 87% retention when CATs were applied. See Figure 3 on page 36.

RELIABILITY OF RETENTION MEASURES

Each school had an assigned "researcher" whose job it was to submit the necessary data to the authors. "Researchers" were given written instructions and each researcher was met with on two occasions to explain what was needed. This proved more difficult than anticipated. The original intention was to collect all retention and grade information directly from Admissions and Records Offices or Data Processing Offices that compile official student record data. The authors met with each college's Admissions and Records Dean, each of whom agreed to provide the necessary data. This proved possible, however, at only four of the eight schools. As was mentioned in the section on limitations of the study, this was a difficult problem at the other schools, whose management of information systems were not yet state-of-the-art. The authors therefore asked the assigned researchers to provide copies of participating instructors personal enrollment sheets that recorded class enrollment, official drops and grades. The retention data was mailed to the research director and then entered by the research director into the StatView program on a McIntosh computer. It was analyzed with the SPSS (Statistical Package for Social Sciences) program.

VALIDITY OF RETENTION MEASURES

Retention and grades are two of the new Accountability Indicators that have been requested of colleges by the California Community College Chancellor's Office (Fetler, 1993). The requirements report is divided into five sub-sets, those of Student Access, Student Success, Student Satisfaction, Staff Composition, and Fiscal Condition. Under the area of Student Success, colleges are being asked to report how many students completed each course with a "C" grade or better. Colleges must look at the retention and the grade distributions in their classes. These appeared to be valid indicators to examine in relationship to a new teaching technique.

RESPONSES TO THE RETENTION DATA PILOT

This proved to be a reliable data collection method with statistical significance, so the decision was made to continue to use this model of pre and post training analysis without change in the design.

Figure 3
RESULTS OF RETENTION PILOT

Pilot Study, Summer 1992
Pre and Post Cross/Angelo Training
Matched Pair of Classes
Same instructor, Same course, Different year
Treatment: Use of Classroom Assessment Techniques

TREATMENT	# of classes	1st Census Enroll-ment	End of Term Enroll-ment	Mean Retained	Standard Deviation	Effect Size
No Feedback (Prior to training) 1990	12	400	343	80.1	6.59	d=1.1
Feedback Post CATs training 1991	12	579	512	87.4	9.28	

CLASSROOM ENVIRONMENT MATCHED CLASS PILOT STUDY

A pilot matched class study was done during the Fall of 1992 to test the use of the CUCEI (College and University Classroom Environment Inventory) instrument. Instructors were asked to use Classroom Assessment Techniques frequently in one class and to completely withhold the CATs from the other class. Differences in classroom environment were to be measured by surveying classes in which the instructor was using Classroom Assessment Techniques in comparison with those classes offered in which the same instructor teaching the same course at the same time was not using any CATs. The CUCEI was conducted during the tenth week of those colleges on the semester schedule. This date was chosen as it fell after midterm exams and before final exams. Permission to use the instrument was obtained from the authors in Australia (Addendum, page 69). The instrument was retyped and a cover sheet added (Addendum, page 65). At each school, administering research faculty were provided with the necessary number of pre-addressed and coded envelopes (Feedback or Non-Feedback), with 100 copies of the CUCEI instrument and with 100 scantron forms.

The survey was administered by the designated researcher at each college, and protocol for the administration of the survey was given to the researcher both verbally and in writing by the authors (Addendum, page 70). The researcher made appointments with each participating instructor for a day and time to come into the classroom. Each researcher administering the survey had the same set of directions to read to the students. A National Computer Systems Survey Sheet Number 16842 was provided and Number 2 pencils were made available. The NCS forms were precoded to identify the school and to identify whether the class was a Feedback or Non-Feedback class. Students were told that the survey was anonymous, that neither they nor their instructor could be identified in any way, and asked not to fill in any of the identification blanks on the form. Students were also told that participation was voluntary and they could choose not to participate in the study with no reflection of non-participation on their grades. Instructors were asked to leave the classroom and 20 minutes was allotted to complete the survey. All participating instructors were given a written thank you and assurance that all responses would be confidential and that their names would not be included on the data collected (Addendum, page 71). It was interesting to note that most instructors were disappointed that their own results would not be identified and shared with them.

The CUCEI's were administered to a total of 624 students in eleven matched classes. The NCS Forms were collected, and put into the coded and pre-addressed envelopes. They were then mailed by the schools to the project director. Upon arrival, the NCS forms were scored on a Hewlitt Packard Sentry 3000 Scanning machine using the Topscore program. The data was then entered into an SPSS program for analysis.

VALIDITY AND RELIABILITY OF CUCEI INSTRUMENT

The College and University Classroom Environment Inventory was developed by Dr. B. Fraser and Dr. David Treagust of the Curtin Institute of Technology in Western Australia. This tool has been used throughout Australia and also in several American studies (Walberg, 1979). Treagust and Fraser identified elements of desirable classroom environment by reviewing all prior published instruments. They established content validity based on categories of human environment well suited to the classroom as identified by Moos (1974). Moos included elements of environment such as the nature and intensity of personal relationships, dimensions of personal growth and self-enhancement, and the extent to which the environment is orderly, clear in expectation, maintains control and is responsive to change. Numbers of faculty and students in Australia were interviewed to assess the validity of the tool. Each revision passed through evaluation by experts in the fields of questionnaire construction and college level teaching. The final product was a 49 question survey with seven subscales. These scales were measures of desirable items in a college classroom. The scales measure the constructs of personalization, involvement, student cohesiveness, satisfaction, task orientation, innovation, and individualization.

Reliability was established in Australia by using Cronbach's alpha coefficient tests on each of the 49 items when expressed to four different groups (student actual response, student desired response, instructor actual response, instructor desired response) in 34 classes. Internal consistency of the elements in the group means ranged from .78 to .96.

Since development, this questionnaire has been accepted as a reliable and valid measure of desirable classroom traits which enhance learning.

RESULTS OF CUCEI MATCHED CLASS PILOT

For this pilot exam, the CUCEI did not reveal any statistical difference, or in fact, any differences at all between the two classes from the same instructor, one class which was receiving CATs and one class which was not. See Figure 4 on page 42.

RESPONSES TO CUCEI PILOT RESULTS

There were three responses to this CUCEI pilot data.

1. At first, the instrument was thought to be an invalid measure to ascertain differences in community college classrooms, and consideration was given to discarding it. The classroom environment literature was again reviewed and the authors of the instrument in Australia were contacted. They affirmed that if there were differences in the classroom environments, that this instrument should be sensitive enough to pick them up.

2. The researchers then questioned whether the participating instructors had followed the research protocol precisely. Upon questioning the instructors, it was found that nearly all participants had corrupted the protocol in some way. Some instructors admitted to using the responses given in the feedback class to make changes in the non-feedback class. Other instructors stated that they used feedback in both classes out of ethical concerns, and indeed one school had to be eliminated from this part of the study because of this. A few instructors stated that they used only a minimal amount of feedback techniques in the feedback class. It was found that there were wide ranges in the number of times that feedback was used between the different participants. The researchers realized that a much tighter protocol with much clearer directions would have to be developed in order to ensure the integrity of the study.

3. A third response to the results of the CUCEI pilot was the supposition that perhaps when instructors are trained in the Cross/Angelo method and accept the premise of a shared teaching/learning partnership with students, that conceivably perhaps they undergo an intrinsic change in behavior that is communicated to students whether actual assessment techniques are used or not. This could explain the absolute lack of difference in responses between trained instructor's matched classes.

Two actions were taken in response to the lack of difference in the CUCEI survey results.

1. An administration of the CUCEI survey was done in 15 additional classes in which the instructors had never been exposed to the Cross/Angelo training. This group was named the Additional Control Group. The data was then analyzed comparing the trained instructors using the CATs in their classrooms with the never trained instructors who did not use CATs in their classrooms. Out of this comparison, one statistically significant difference was identified between those two groups. The subscale measure of classroom cohesiveness, a factor known to contribute to retention (Triesman, 1985), was found to be

different between the classes using and not using the model. (See Figure 6.) Therefore the researchers decided to go ahead with the instrument, initiating new and very explicitly defined protocol instructions.

2. To tighten the protocol, much more stringent standards were developed. Each faculty member participating in the Spring, 1993 study was given a contract to sign, a wall poster (Addendum, pages 72-73) delineating each week's activities (use of a minimum of one feedback technique every two weeks in the feedback class and absolutely no feedback techniques in the other), and a personal interview by the researchers. Two mandatory regional group meetings with the data collectors were held, with distinct instructions delivered. With these newly delineated responsibilities, the participants could be expected to carry out the research design.

ADDITIONAL RESULTS OF MATCHED CLASS STUDY, FALL, 1992

As mentioned previously, between the matched classes of instructors trained in the method who used the method in one class but withheld it in the other, no differences were found on the classroom environment scales. In both cases, the students indicated the same satisfaction with this instructor's classroom environment. Instructors who participated in the matched class study were also asked to send the researchers their two final grade sheets and to fill out a questionnaire asking about their perceptions of the two classes (Addendum, page 74). Although some instructors indicated that they could feel a difference and some indicated they could not feel a difference between the classes, an important secondary finding occurred. When grade sheets were examined, a difference was found in the grade distributions. In non-feedback classes, 20% of the students received D or F grades. In feedback classes, instructors gave many fewer D's and F's (only 07%) and many more A, B and C grades (93%). A relationship appears to exist between the use of anonymous and continuous feedback and positive student grades. See Figure 7.

An instructor opinion survey was sent to the eleven instructors participating in the matched class study. Seven instructors (64%) returned the survey. Instructors stated that students in the feedback classes more often came to class on time (25% more often), attended regularly (60% more often), came with their textbooks (33% more often), came with their homework done (50% more often), asked questions about the classroom material (100% more often), and used office hours more often (50%) than when compared to non-feedback classes. Non-feedback classes were identified as coming to class late more often, and remaining quieter in class when the instructor was talking. There were no differences in how often students came with paper to write on, brought pencils to class, or remained quiet while another student was talking. This survey indicated that in classes where CATs were being used, more positive student behaviors were perceived by the instructors.

Figure 4
RESULTS OF THE CUCEI PILOT STUDY for 3 GROUPS
Matched classes for one instructor, feedback and non-feedback, and additional control group of instructors not trained in the method

Scales on CUCEI	No Feedback Group Trained Instructors 294 students 11 classes		Feedback Group Trained Instructors 330 students 11 classes		Additional Control Group 278 students 15 classes		p value	Statistical Significance
	mean	stand. dev.	mean	stnd. dev.	mean	stnd. dev.		
Personalization	3.18	.56	3.12	.58	3.18	.53	p. = .215	non-sig.
Involvement	2.88	.46	2.83	.43	2.88	.45	p. = .220	non-sig.
Cohesiveness	2.40	.57	2.43	.56	2.57	.60	p. = .003	significant
Satisfaction	3.02	.57	3.04	.50	3.08	.55	p. = .381	non-sig
Task	3.16	.46	3.18	.46	3.22	.49	p. = .349	non-sig
Innovation	2.60	.47	2.62	.45	2.56	.51	p. = .110	non-sig
Individualization	2.28	.47	2.67	.49	2.28	.50	p. = .701	non-sig
Compiled Score	2.79	.36	2.79	.34	2.82	.37	p. = .279	non-sig

Figure 5
GRADE DISTRIBUTION
Matched classes Different sections
Same course, same instructor, same time, same place
All CATS trained instructors
Treatment: Use of Classroom Assessment Techniques
Fall 1992

GROUP	No Treatment No feedback used (11 classes N=194)		Treatment Feedback used (11 Classes N=188)	
GRADE DISTRIBUTION				
A	38%		45%	
B	28%		33%	
C positive grades	17%	83%	15%	93%
D	06%		03%	
F negative grades	11%	17%	04%	07%

Chapter Five

Research Studies

SECOND RETENTION STUDY

After completion of the pilot testing, the authors then repeated the collection of pre and post retention data in a larger study during Fall of 1992. In this second study, six colleges participated and 12 classes were used for data collection. Instructors were randomly selected from among those attending the classroom assessment training at the eight schools, who had taught the same class that they were using the CATs in, one year prior. Again retention data was compared between the matched classes pre and post training. In this study, the variable of class grade point average was added.

In the Fall, 1992 study, consistent with previous retention studies, there was a slight increase in retention, from 78% pre-Classroom Assessment Training to 81% post training. When the data was looked at for each school separately, four of the six schools had increases in retention post training. When retention was analyzed by gender, males had a significant increase and females a slight increase in retention post training. Retention was also examined by ethnicity, and both new majority and white students increased in retention post training. These results are displayed on Figures 6 and 7. Similar to the study at College of Marin (Stetson, 1989), there was no increase in grade point average noted, as displayed on Figure 6a.

Figure 6
RESULTS OF SECOND RETENTION STUDY, INCLUDING GENDER
Fall 1992
Pre and Post Cross/Angelo Training
Sam . instructor, Same course, Different year
Treatment: Use of Classroom Assessment Techniques

TREATMENT	# of classes	1st Census Enroll-ment	End of Term Enroll-ment	Mean Retained	Standard Deviation	Effect Size	Male Retention	Effect Size	Female Retention	Effect Size
No Feedback (Prior to training) 1991	12	330	252	77.8	1.15	d=.269	71.7 (1.26)	d=.62	82.7 (1.46)	d=.04
Feedback During CATs training 1992	12	362	287	80.9	1.25		79.5 (1.57)		83.4 (1.43)	

Figure 6a Grade Point Average Comparison

GROUP	GPA
NO FEEDBACK 12 CLASSES 330 STUDENTS	2.481
FEEDBACK 12 CLASSES 362 STUDENTS	2.349

Figure 7
RESULTS OF RETENTION STUDY, FALL 1992
FOR EACH SCHOOL AND BY ETHNICITY
Pre and Post Cross/Angelo Training
Matched Pair of Classes
Same instructor, Same course, Different year

SCHOOL	NO FEEDBACK MEAN NUMBER STUDENTS RETAINED	FEEDBACK MEAN NUMBER OF STUDENTS RETAINED
SCHOOL 1	.786	.821
SCHOOL 2	.878	.793
SCHOOL 3	.697	.770
SCHOOL 4	.826	.970
SCHOOL 5	.815	.867
SCHOOL 6	.669	.634
BY ETHNICITY		
WHITE	.776	.847
NEW MAJORITY (Amer. Indians, Pac. Islanders, Asians, Black, Hispanic, Filipino, Other)	.758	.813

FINAL RESEARCH DESIGN

The final matched class research design combined elements from the pilot and initial small scale studies. It examined retention overall, retention by ethnicity and gender, and examined grade distribution and grade point averages. The study included the use of the CUCEI inventory and a survey to instructors asking their opinions of the use of the Cross/Angelo method. See Figure 8 below:

Figure 8
SPRING 93 FINAL DESIGN
MATCHED CLASS STUDY
ALL INSTRUCTORS TRAINED IN CLASSROOM ASSESSMENT TECHNIQUES

ONE SECTION USES FEEDBACK TECHNIQUES	ONE SECTION WITHHOLDS FEEDBACK TECHNIQUES
SAME COURSE SAME INSTRUCTOR SAME BASIC TIME SAME SEMESTER	SAME COURSE SAME INSTRUCTOR SAME BASIC TIME SAME SEMESTER
CUCEI DATA COLLECTED WEEK 10	CUCEI DATA COLLECTED WEEK 10
COURSE IS COMPLETED COMPLETE RETENTION DATA IS COLLECTED 1ST CENSUS, END OF TERM, GPA, GRADE DISTRIBUTION, ETHNICITY, GENDER	COURSE IS COMPLETED COMPLETE RETENTION DATA IS COLLECTED 1ST CENSUS, END OF TERM, GPA, GRADE DISTRIBUTION, ETHNICITY, GENDER

Additional Design

INSTRUCTOR SURVEYS DISTRIBUTED TO ALL FACULTY TRAINED IN CROSS/ANGELO METHOD DURING GRANT YEAR 1992-1993

For the final study, as described earlier, a very strict protocol was developed to show instructors exactly what to do. Every participant signed a written contract (Addendum, pages 75-76).

The designated school researcher collected first census enrollment sheets from the participants. On these sheets, ethnicity and gender were identified. Percentages of men, women, Asian/Pacific Islanders, Alaskan/Native Americans, Black, White, Hispanic, Filipino, Other and No Answer were calculated. The data was mailed to the research director. The researcher entered the data on a McIntosh Computer and analyzed it using the StatView program. Because numbers of individual minorities were small, the researcher combined all ethnic groups other than White into an overall group called New Majority students.

On the tenth week of the semester, the CUCEI surveys were administered to students in all classrooms. In an attempt to answer a question posed by the California Community College Chancellor's Office, i.e., does classroom assessment help women and minorities succeed in math, science and technology classes, three anonymous demographic questions were added to the survey. Students were asked their gender, ethnicity, and whether the class they were in was a math, science, vocational or technology class. The data was then analyzed not only by feedback group and non-feedback group, but by specific gender and ethnic subsets within the groups, and by type of class. When analyzing the CUCEI data, the feedback class data was also compared with the additional control group of untrained instructors developed as part of the pilot exam.

After the final date to drop, approximately the twelfth week, census sheets were once again collected by the researchers at each school. Calculations were made for retention overall, retention by gender, and retention by ethnicity.

At the semester's end, grade sheets were collected and mailed to the research director. Class grade point average and grade distributions were calculated.

Surveys were sent to all instructors who were trained in the Cross/Angelo method during 1992-1993 to ask their opinions of the effect of the method in their classrooms.

TESTS USED FOR DATA ANALYSIS

To calculate retention comparisons, data was analyzed using StatView 512+ on a MacIntosh computer. Means, standard deviations, percentages, column totals and effect sizes were computed.

Effect size was calculated using the difference between the means for each treatment group, and the standard deviation for the no feedback group.

To calculate grade point average, StatView 512+ on the MacIntosh computer was used to calculate means, standard deviations and percentages.

To analyze grade distribution, the calculator on the MacIntosh computer was used to do addition, multiplication and percentages for each grade subset in each treatment group.

To analyze the CUCEI data, unmatched t-tests were done for the feedback and non-feedback group for the seven subscales. Unmatched t-tests were also run for subsets of the population which included males, females, whites, new majority, and students enrolled in vocational education classes. Two-Way Analysis of Variance was done for each of the groups named above. Additionally, effect sizes were computed for t-test results. The CUCEI results were analyzed using SPSS (Statistical Package for Social Sciences) on an I.B.M. computer. To develop the category of new majority students, individual subsets of ethnic data were collapsed into a larger category as each sub-set was too small to analyze separately.

To tabulate instructor opinion of the differences in their matched classes, a handheld calculator was used to calculate means and percentages.

To tabulate all trained instructor opinion, surveys were read and all responses were tabulated by hand.

RESULTS OF RESEARCH STUDY

During the Spring of 1993, the study design was inclusive of all previous tests. Six schools participated in this study. The overall end of term retention was the weakest for the three retention studies done (Pilot Fall, 1992; Spring, 1993). Overall retention went up only one percent, and went up significantly only at one school. Retention by gender in this study had very strong results, with female students in classes using the Cross/Angelo method reflecting an additional nine percent increase over the norm. Retention did not change for men, new majority or white students.

Grade point average was higher overall in classes using the Cross/Angelo method, but not significantly higher.

Grade distribution showed differences, but not as strongly as in the Fall, 1992 study. In this case, overall distribution was about the same, but feedback classes showed 5% more "A" grades. See Figure 9. This is consistent with a larger number of "A" grades in the feedback classes occurring in the Fall, 1992 study.

The CUCEI findings for the Spring, 1993 study were consistent with the Fall study. Once again, there was very little difference when Cross/Angelo instructors were measured against themselves. There were, however, major differences when the trained instructors were matched to the additional control group. There were statistical significances found in the compiled CUCEI scores and in six of the seven of the sub-scales. These differences are especially important as the protocol for the trained instructors was clearly followed this semester. These findings strongly suggest that when CATs are consistently and reliably applied, there are major differences in how students feel about the classroom environment, significant at the $p = .000$ level.

The CUCEI results were also analyzed with two-way analysis of variance. The findings here indicated a very strong connection between the use of CATs and a positive learning experience for women and new majority students. When data was analyzed by treatment (CATs) with ethnicity, there were main effects for ethnicity on the subscales Task ($F = 8.726$, $p = .003$) and Personalization ($F = 9.796$, $p = .002$). There was an interaction effect for treatment (CATs) with ethnicity on the subscale Cohesiveness ($F = 4.492$, $p = .034$). Interaction effects at these levels suggest that we can safely assume that new majority students felt better in these CATs classes and that this fact cannot be attributed to chance alone.

When data was analyzed by treatment (CATs) with women students, there were several areas of main effect. Women students felt more involved in the class ($F = 3.267$, $p = .039$) and more satisfied ($F = 4.474$, $p = .035$).

When the data was analyzed for use of CATs with new majority women students, very significant findings arose. These students felt that their learning was personalized ($F = 15.852$, $p = .000$), and overall they rated the classroom environment much higher than in classes they took where CATs were not used (Compiled Score $F = 4.648$, $p = .032$).

Figure 9
RESULTS OF FINAL STUDY
SPRING 1993
Matched classes Different sections
Same course, same instructor, same time, same place
All CATs trained instructors

Group Census	Non-Use of Techniques (N=488 students, 15 classes)	Use of Techniques (N=492 students, 15 classes)
End of Term Retention	78%	79%
End of Term Retention Women	76%	85%
End of Term Retention Men	80%	76%
End of Term Retention New Majority	79%	78%
End of Term Retention White	80%	79%
Mean Grade Point Average	2.49 (.493)	2.58 (.487)
A, B, C Grades	82%	83%
%D, F Grades	18%	17%
Retention by School School 1	.879	.858
School 3	.765	.708
School 4	.581	.835
School 5	.866	.865
School 6	.738	.726
School 7	.674	.584

Figure 10
RESULTS OF THE CUCEI STUDY for 3 GROUPS
SPRING 1993

Matched classes for one instructor, feedback and non-feedback, and additional control group of instructors not trained in the metho

	No Feedback Group Trained Instructors 324 students 16 classes		Feedback Group Trained Instructors 335 students 16 classes		Additional Control Group 278 students 15 classes		p value	Statistical Significance	Effect Size
Scales on CUCEI	mean	stand. dev.	mean	stand. dev.	mean	stnd. dev.			
Personalization	2.43	.317	2.43	.321	3.18	.532	p. = .000	yes	d = 1.41
Involvement	2.36	.337	2.29	.313	2.88	.450	p. = .000	yes	d = 1.306
Cohesiveness	2.50	.272	2.48	.272	2.57	.596	p. = .000	yes	d = .144
Satisfaction	2.59	.290	2.62	.283	3.08	.547	p. = .000	yes	d = .84
Task	2.41	.321	2.45	.304	3.22	.488	p. = .000	yes	d = 1.57
Innovation	2.50	.325	2.52	.350	2.56	.507	p. = .507	no	d = .09
Individualization	2.44	.361	2.46	.331	2.28	.500	p. = .000	yes	d = .36
Compiled Score	2.45	.203	2.46	.187	2.82	.367	p. = .000	yes	d = .98

ADDITIONAL INSTRUCTOR SURVEY

A survey form was distributed to all eighty instructors at the eight colleges who were trained in the Cross/Angelo model during the 1992-1993 school year. Forty-six questionnaires (56%) were returned. Instructors anonymously answered the following questions:

1. Was the training a good use of your time?

   All 46 instructors felt that the Cross/Angelo training was a good use of their time.

2. Were you able to meet new instructors on your campus and develop a sense of collegiality that might not have occurred otherwise?

   Instructors stated that they were able to meet new people or spend time with people that they already knew for the purpose of talking about teaching. Many instructors indicated that this was the best part of the training.

3. Do you think that asking students for feedback makes you a better teacher?

   Most instructors felt that asking for feedback made one a much better teacher. One instructor wrote "It is not so much my asking for feedback as my responding to the feedback that makes me better."

4. How did your students respond to being asked for their feedback?

   Ninety percent of the faculty stated that students responded positively. Ten percent stated that students occasionally felt that this was wasting valuable class time.

5. What was your best experience with Classroom Assessment in your classes?

   Instructors cited many interesting positive things that had happened to them as a result of asking for and responding to feedback. One person wrote "My best experience was watching the smiles on student faces when I reported back to them the results of their feedback."

6. Were there any negative experiences?

   Forty-five out of forty-six instructors (98%) indicated that there were absolutely no negative experiences with the use of Classroom Assessment Techniques. Only one (2%) stated that the students felt time in class was being wasted.

7. Do you think that Classroom Assessment can help women and minority students succeed in classes that they might otherwise have dropped or failed?

   Instructors indicated that allowing women and minority students the chance to give anonymous feedback which would allow them to have points clarified may have had an influence on minority retention. Instructors felt that without the anonymous cards these groups might have been afraid to speak up and get help.

8. Do you think that this program should be continued at your school?

   All those responding said yes. One person wrote that s/he would like to know how much the program cost.

9. Is there anything that you can do to support the continuation of this program?

   All respondents stated that they would "talk this program up." Some suggested that this be an ongoing flex day activity.

Additional Comments:

The additional comments made by faculty were compliments about the individual project leaders at their school. Respondents felt that the leaders had been committed, professional and inspirational teachers of the model, and had conducted sessions that were most instrumental to professional growth.

DISCUSSION

The California Community College Chancellor's Office, the Federal Government, and many individual college districts have funded dissemination of and training in the Cross/Angelo model of Classroom Assessment. Qualitative and anecdotal reports about the Cross/Angelo CATs method has been consistently positive in nature.

During the year prior to and the year of the research project, the authors of this report traveled extensively, disseminating information about the model and conducting training sessions. In every instance, audiences responded to what was presented positively, as was evidenced by their questions, requests for training information and for the results of this study when they were available. As the model acceptance grew, researchers attempted to link the use of CATs in the classroom to positive student outcomes.

In the Spring of 1992, the California Community College Chancellor's Office expressed interest in exploring whether quantitative data would support the positive results of the qualitative and anecdotal reports. This study was funded by the Chancellor's Office to investigate the possibility. The Chancellor's Office additionally questioned whether the use of CATs could improve women and minority retention in math, science and technology classes.

The results of this study do support the qualitative and anecdotal results as previously collected. However, the quantitative results are not as dramatic as qualitative or anecdotal data. What was found, using as strict a protocol as working with 70 teachers at eight different sites can be, was as follows:

1. Does the use of Classroom Assessment Techniques have an effect on retention?

   Consistent with previous studies, the use of Classroom Assessment Techniques to solicit student feedback appears to have an effect on retention, which ranged in our study from between 1 to 8 percent.

2. Does the use of Classroom Assessment Techniques have an effect on final grades and grade distribution?

   There appears to be a correlation with the use of the techniques and more positive grade distribution, especially in the number of "A" grades given when Classroom Assessment Techniques are used. Grade point averages have been about the same.

3. Does the use of Classroom Assessment Techniques have an effect on course completion by gender?

   Female students seemed to persist as evidenced by nine percent higher retention in classes where CATs were being used. Female students also had significant differences than males on their opinions of the classroom environment when CATs were used. This appeared on the CUCEI inventory in the overall compilation and in the subsets of personal, involvement, satisfaction and individualization. Female new majority students in math, science and technology classes had a greater feeling of satisfaction and involvement than any other group.

4. Does the use of Classroom Assessment Techniques have an effect on course completion by ethnicity?

   Although there did not appear to be a difference in the retention rates between new majority students and white students when examined by treatment, there was a clear difference in how new majority students felt about the classroom environment in classes using the methods. Positive statistical significance arose in areas of task understanding, cohesiveness, and personalization for new majority students.

5. Does the use of Classroom Assessment Techniques influence the classroom environment?

   Students like it. There was increased student self report of class involvement, cohesiveness, personalization, satisfaction, task understanding, and instructor innovation in classes were the instructor was trained in and using the CATs as compared to classes where instructors were not trained in the method and CATs were not used.

   Teachers consistently like it. Anonymous feedback collected from 46 Cross/Angelo trained instructors reported 98% satisfaction with the use of the model in their classes and 2% of negative experiences with the model. As reported earlier, instructors liked using the method so well that many refused to withhold the CATs techniques from students.

The null hypothesis, that there would be no differences in measurements of student outcome (retention, grade point average and grade distribution, course completion by gender and ethnicity and classroom environment) in courses where Classroom Assessment Techniques were used when compared to matched classes in which Classroom Assessment Techniques were not used, can be rejected in the areas of

overall retention, grade distribution, retention by gender, and classroom environment. Retention differences by ethnicity did not occur, but strong differences in opinion of classroom environment were present. The null hypothesis cannot be rejected for the area of grade point average.

The researchers also felt that something appears to happen to instructors when they are Cross/Angelo trained. There was a clear difference in classroom environment between those who have volunteered for Cross/Angelo training and were using CATs in the classroom and those who did not volunteer for the training and were not using CATs. Whether the difference is that the very instructors who volunteer to learn something new to make them better teachers are different from those who do not volunteer, or the difference is that once instructors are open to the partnership with students they are intrinsically changed, we are not certain. We do know that when we measured the groups of Cross/Angelo trained instructors against themselves, in both Fall of 1992 and Spring of 1993, there were no differences. Whether these groups were using 3X5 cards to collect anonymous feedback or not, students had identical responses to them. This is an area that is commands further exploration.

RECOMMENDATIONS

1. There should be continued dissemination of this model to faculty in higher education. This should be particularly targeted to areas in which women students have traditionally not succeeded as it appears that the model has a positive effect on female retention. The model also seemed to benefit new majority students who felt a sense of personal ability to interact with the instructor and cohesiveness towards the group. We know from the work of Triesman that these findings are important.

2. Faculty should continue to be trained by Cross and Angelo at the UC, Berkeley Summer Sessions for as long as they are offered, or at any other forum in which the authors of the model are doing the training. Additional recommended trainers are listed in the Catlin and Kalina manual (1993) found in the reference section.

3. Instructional improvement projects which bring groups of instructors together for the purpose of talking about teaching should continue. Many faculty reported that this process resulted in a recommitment to teaching in ways that were very positive.

4. The use of the Australian College and University Classroom Environment Inventory, the CUCEI, should be continued. This was the first use of the instrument in a California Community College setting, and it did appear to be quite useful in defining classroom environment. One suggestion might be to repeat the matched class studies and to add administration of the instrument to the faculty teaching the classes as well. Teacher opinion of the classroom environment was a recommended use by Treagust and Fraser, who felt that the closer the student's desired environment was to the teacher's desired environment, the more positive learning would take place.

5. Although the purview of this study was not on the success of women in math and science, the finding suggests that CATs will help. Commentary is provided in the Addendum by Professor of Social Sciences, Lauren Coodley.

6. As Angelo noted in his June, 1993, remarks, and as the authors noted in this report, something appears to happen to faculty when involved with the Cross/Angelo method. The literature suggests that "teacher effect" is the major influence on student success. What qualities constitute a "good teacher" and how faculty can learn these qualities is an area calling for further exploration.

7. Conducting a multi-site consortium research project requires clear directions and explicit protocols. Release time for participants rather than stipends, campus researcher involvement, larger than anticipated travel budgets to make frequent face-to-face visits, compatible computer systems, signed contracts for work to be done and payment tied directly to performance are some areas that were brought to light. Positive findings were that multi-site work allows for a larger and more diverse "N" and group writing allows for expansion of ideas beyond what one or two people could create. The Infonet communication system functions extremely well for this type of group effort. These findings will be included in a manuscript in progress (Catlin, 1993) and the authors hope that what they have learned during this year will benefit others planning to undertake such a project.

ADDENDUM

Classroom Assessment Project
Napa Valley College
2277 Napa-Vallejo Highway
Napa, CA 94558
(707) 253-3135

September 9, 1992

To: Admissions and Records Officer

From: Michelle Kalina, Research Director
Anita Catlin, Project Director
LARC Classroom Assessment Grant
FII-#92-0016

Re: Retention Data

Thank you for your assistance with the State Chancellor's Office Funds for Instructional Improvement Grant that your college is participating in. We will need your help in providing the information listed below.

The Research Coordinator appointed at your school will provide the following:
Instructor's Name:
Course code:
Section Number:
Semester Taught:

We will then need:
First Census Enrollment
Gender Distribution at First Census
Ethnic Distribution at First census

End of Term Enrollment
End of Term Grade Mean
Gender Distribution at End of Term
Ethnic Distribution at End of Term

All information will be held confidential. Instructor and student names will be removed from the data.

We thank you very much for your support of this statewide grant activity.

Napa Valley College

Napa, California, 94558
(707)253-3100

OFFICE OF INSTRUCTION AND STUDENT SERVICES

TO: Admissions and Records Offices
Participating Schools in Classroom Assessment Research Grant

FROM: Napa Valley College, Grant Project Director

DATE: July 27, 1992

RE: Funds for Instructional Improvement--Chancellor's Office

As a requirement of the research grant received from the Chancellor's Office, FII-92-0018, we will be collecting retention data for classes in which the instructors are using the Classroom Assessment process. Over the next school year, we will be asking you for limited data regarding student success. This semester, we will need first census lists and final grade reports for designated classes.

Protection of Human Subjects will be assured, as we will not be using any names of instructors or students for our data collection, and the data from your college will be combined with the other eight colleges. We will be looking at the relationship, if any, between Classroom Assessment techniques, grades and retention. We may later do some statistics regarding ethnicity of students, but again, no names will be used.

We greatly appreciate your cooperation in this project. The ultimate goal is to improve instruction for students. Please feel free to call Anita Catlin, Project Director, at Napa Valley College, 707-253-3135, with any questions.

Dear Student,

This research survey is a voluntary study of classroom environments being conducted throughout the State of California. Neither you nor your instructor will be able to be identified in any way. Your instructor will not see the results of this survey. Your status in class and grades will not be affected by either your participation or non-participation in the study. You have the right to refuse to participate. We thank you very much if you have chosen to participate. Your opinions will help us in the development of teacher training programs.

Please feel free to ask the person administering the survey if you have any questions.

Thank you!

COLLEGE AND UNIVERSITY CLASSROOM ENVIRONMENT INVENTORY (CUCEI)

Developed by Dr. David F. Treagust and Dr. Barry J. Fraser
Western Australia Institution of Technology

Directions

The purpose of this questionnaire is to find out your opinions about the class you are attending right now.

This form of the questionnaire assesses your opinion about what this class is actually like. Indicate your opinion about each statement by darkening in the correct bubble:

A -	if you STRONGLY AGREE	that it describes what this class is actually like.
B -	if you AGREE	that it describes what this class is actually like.
C -	if you DISAGREE	that it describes what this class is actually like.
D -	if you STRONGLY DISAGREE	that it describes what this class is actually like.

- All responses should be on the attached ScanTron.
- Do not put your name on the ScanTron.
- Use a number "2" pencil.
- If you must erase, please erase completely.

1. The instructor considers students' feelings.
2. The instructor talks rather than listens.
3. The class is made up of individuals who don't know each other well.
4. The students look forward to coming to classes.
5. Students know exactly what has to be done in our class.
6. New ideas are seldom tried out in this class.
7. All students in the class are expected to do the same work, in the same way and in the same time.

8. The instructor talks individually with students.
9. Students put effort into what they do in classes.
10. Each student knows the other members of the class by their first names.
11. Students are dissatisfied with what is done in the class.
12. Getting a certain amount of work done is important in this class.
13. New different ways of teaching are seldom used in this class.
14. Students are generally allowed to work at their own pace.

15. The instructor goes out of his/her way to help students.
16. Students "clockwatch" in class.
17. Friendships are made among students in this class.
18. After the class, the students have a sense of satisfaction.
19. The group often gets sidetracked instead of sticking to the point.
20. The instructor thinks up innovative activities for students to do.
21. Students have a say in how class time is spent.

22. The instructor helps each student who is having trouble with the work.
23. Students in this class pay attention to what others are saying.
24. Students don't have much chance to get to know each other in this class.
25. Classes are a waste of time.
26. This is a disorganized class.
27. Teaching approaches in this class are characterized by innovation and variety.
28. Students are allowed to choose activities and how they will work.

29. The instructor seldom moves around the classroom to talk with students.
30. Students seldom present their work to the class.
31. It takes a long time to get to know everybody by his/her first name in this class.
32. Classes are boring.
33. Class assignments are clear so everyone knows what to do.
34. The seating in this class is arranged in the same way each week.
35. Teaching approaches allow students to proceed at their own pace.

36. The instructor isn't interested in students' problems.
37. There are opportunities for students to express opinions in this class.
38. Students in this class get to know each other well.
39. Students enjoy going to this class.
40. This class seldom starts on time.
41. The instructor often thinks of unusual class activities.
42. There is little opportunity for a student to pursue his/her particular interest in this class.

43. The instructor is unfriendly and inconsiderate towards students.
44. The instructor dominates class discussions.
45. Students in this class aren't very interested in getting to know other students.
46. Classes are interesting.
47. Activities in this class are clearly and carefully planned.
48. Students seem to do the same type of activities every class.
49. It is the instructor who decides what will be done in our class.

Questions about you

50. Gender
    a. male
    b. female
51. Ethnicity
    a. Alaskan/Native American
    b. Asian/Pacific Islander
    c. Black
    d. White
    e. Hispanic
    f. Filipino
    g. Other

52. Is this class a math, science, technology, nursing or vocational training course?
    a. yes
    b. no

Thank you very much for your assistance. If you desire further information, please contact either Dr. Michelle Kalina at Sierra College at 916-624-3333, ext. 2274, or Anita Catlin at Napa Valley College, 707-253-3135.

curtin
University of Technology
Perth Western Australia

FACSIMILE TRANSMISSION

SCIENCE AND MATHEMATICS EDUCATION CENTRE

GPO Box U 1987
Perth 6001
Western Australia

DATE: 10.8.92 NO OF PAGES: (including cover) 1

TO: Dr Michelle Kalina AT FAX NO: 1-707-255-4307

Napa California - Sierra College

FROM: David + Trevynt.

COMMENTS

Michelle, We have received your fax and the CUCFI instrument has been sent to you. You have our permission to use the study & we wish you well with your research.

I apologize for the delay in [illegible] was on leave in Europe [illegible] letter arrived.

Trevynt

77

RECEIVING THIS TRANSMISSION, PLEASE 96. OR FAX ON 61 9 351 2503

Classroom Assessment Project
Napa Valley College
2277 Napa-Vallejo Highway
Napa, CA 94558
(707) 253-3135

PROTOCOL FOR ADMINISTERING THE CUCEI INSTRUMENT-SPRING 93 STATEWIDE FII GRANT#92-0016

1. The researcher will arrange an appropriate time to collect the CUCEI data during the tenth week of the semester with the two instructors involved in the matched class pilot study.

2. When going in to administer the survey, each class and each instructor will have a specified envelope. It is imperative for the integrity of the research that these envelopes be administered properly. A further check can be on the third digit code number, 0 = No Feedback, 1 = Feedback techniques used.

3. The researcher will bring the questionnaires, the scantrons, pencils and envelopes to the classroom. The researcher will distribute and collect all items upon completion. Please show students the scantron. (There may be students in the class who have never used a scantron.) Explain where the numbers 1-52 start and stop. Tell them that nothing else should be filled in by them except these 52 answers. Remind them about erasing well.

4. The researcher will read the disclaimer and directions printed on the front page of the CUCEI document and field all questions. The researcher should ask students to look over the instrument and ask for any word definitions that they do not understand. Words may be defined for the students.

5. There are now three additional questions on the form. Please help determine whether this class is a math, science, technology, nursing or vocational training class. We are defining vocational as any course which directly prepares a student for a job skill, such as drafting, bookkeeping, art graphics, etc.

6. If there are students who do not wish to participate, they may remain quietly in class or be excused by the instructor, per instructor preference. The instructor need not be present while the survey is being administered.

7. The researcher may tell students about this instrument, developed in Western Australia by Treagust and Fraser. We found the instrument by means of a library search and have obtained the developers' permission to use the instrument in our study, to measure as they did, students' opinions of their classes.

Classroom Assessment Project
Napa Valley College
2277 Napa-Vallejo Highway
Napa, CA 94558
(707) 253-3135

September 4, 1992

TO: All Instructors participating in the CAP research project

FROM: Michelle Kalina and Anita Catlin

Thank you for allowing your students to participate in the CAP research project. Your volunteering to help with this research is much appreciated by us and the Chancellor's office (our funding source).

This is to assure you that all data collected will **not** be identifiable by either instructor, names of students or school and will only be analyzed as a group of 8 community colleges. Individual data will not be shared with administrators and only group means and standard deviations will be reported.

Due to this, we won't be able to share your own classroom results with you as we are not analyzing them by class or by school. However, you can run a similar survey yourself to get your own data at another time.

If you have any question or concerns, please contact Michelle Kalina at 916-624-3333 ext. 2274.

A QUICK CHECKLIST FOR PARTICIPATION IN THE CLASSROOM ASSESSMENT STUDY

- ❑ I HAVE IDENTIFIED TWO DAY SECTIONS OF THE SAME CLASS.
- ❑ THESE CLASSES ARE AND THEY MEET AT:

  _____

  _____ .
- ❑ I WILL USE CLASSROOM ASSESSMENTS IN MY _____CLASS.
- ❑ I WILL NOT USE CLASSROOM ASSESSMENTS IN MY _____CLASS.
- ❑ TODAY,_____, 1993, WAS THE FIRST MEETING OF MY FEEDBACK SECTION CLASS. I USED CLASSROOM ASSESSMENT TECHNIQUES TO SET THE TONE AND ASSESS MY STUDENTS.
- ❑ TODAY,_____, 1993, WAS THE FIRST MEETING OF MY NON-FEEDBACK CLASS. I TAUGHT HOW I USED TO TEACH BEFORE LEARNING ABOUT CLASSROOM ASSESSMENT TECHNIQUES.
- ❑ I AM CLEAR THAT I AM TO USE FREQUENT ASSESSMENTS IN THE FEEDBACK CLASS, AND NONE AT ALL IN THE NON-FEEDBACK CLASS.
- ❑ TWO WEEKS HAVE PASSED, AND I HAVE USED AT LEAST ONE NEW ASSESSMENT IN MY FEEDBACK CLASS.
- ❑ FIRST CENSUS LISTS HAVE COME OUT AND I MADE A COPY OF MINE IN BOTH CLASSES FOR THE RESEARCHERS.
- ❑ TWO WEEKS HAVE PASSED, AND I HAVE USED AT LEAST ONE NEW ASSESSMENT IN MY FEEDBACK CLASS.
- ❑ TWO WEEKS HAVE PASSED, AND I HAVE USED AT LEAST 1 NEW ASSESSMENT IN MY FEEDBACK CLASS.

- ❑ TWO WEEKS HAVE PASSED, AND I HAVE USED AT LEAST ONE NEW ASSESSMENT IN MY FEEDBACK CLASS.

- ❑ IT IS TIME FOR THE CECUI INSTRUMENT TO BE ADMINISTERED IN BOTH MY CLASSES. THE RESEARCHER SHOULD PLAN TO COLLECT DATA IN MY FEEDBACK CLASS ON _____ AT _____ .

- ❑ THE RESEARCHER SHOULD PLAN TO COME TO MY NON-FEEDBACK CLASS ON _____AT_____.

- ❑ I HAVE TOLD MY STUDENTS THAT THE RESEARCHER IS COMING IN AND ALLOWED TIME IN MY CLASS SCHEDULES.

- ❑ TWO WEEKS HAVE PASSED, AND I HAVE USED AT LEAST ONE NEW ASSESSMENT IN MY FEEDBACK CLASS.

- ❑ TWO WEEKS HAVE PASSED, AND I HAVE USED AT LEAST ONE NEW ASSESSMENT IN MY FEEDBACK CLASS.

- ❑ TWO WEEKS HAVE PASSED, AND I HAVE USED AT LEAST ONE NEW ASSESSMENT IN MY FEEDBACK CLASS.

- ❑ I HAVE NOW COMPLETED THE SEMESTER (OR QUARTER) AND HAVE CLEARLY TREATED MY TWO POPULATIONS DIFFERENTLY WHILE TEACHING THE SAME COURSE CONTENT.

- ❑ IF I HAVE ANY QUESTIONS, I CAN CALL MICHELLE KALINA AT 916-624-3333 EXT. 2274 OR ANITA CATLIN AT 707-253-3135.

- ❑ I KNOW THAT I AM A VERY VALUABLE PERSON AND HAVE CONTRIBUTED TREMENDOUSLY TO THE SUCCESS OF THIS PROJECT. THE CHANCELLOR'S OFFICE, MY COLLEGE, ANITA AND MICHELLE THANK ME FROM THE BOTTOM OF THEIR COLLECTIVE HEARTS.

INSTRUCTOR SURVEY FOR MATCHED CLASS STUDY FALL, 1992

Directions: If your students exhibited the behavior, place a check mark in the appropriate box.

BEHAVIOR: Did most of your students:	NON-FEEDBACK	FEEDBACK
Come to class on time?	☐	☐
Attend Regularly?	☐	☐
Come with their textbooks?	☐	☐
Come with paper to write on?	☐	☐
Come with pens/pencils?	☐	☐
Come with homework done?	☐	☐
Come late to class?	☐	☐
Come without textbooks?	☐	☐
Come without paper?	☐	☐
Come without pens/pencils?	☐	☐
Come without homework done?	☐	☐
Remain quiet while teacher was talking?	☐	☐
Remain quite while another student was talking?	☐	☐
Ask questions about classroom material?	☐	☐
Ask irrelevant questions?	☐	☐
Talk regardless of who else was talking?	☐	☐
Increased student use of office hours?	☐	☐

COMMENTS:

82

November 5, 1992

TO: CAP Faculty Research Participants, Spring '93 Matched Class Study

FROM: Michelle Kalina, Research Director
Anita Catlin, FII Project Director

RE: Your participation in the FII #92-0016 Grant Study Spring '93

Thank you all for agreeing to participate in the Classroom Assessment project (CAP) study which will occur in the Spring Semester, 1993. This is a study to examine the effects of classroom assessment techniques on student outcomes. Following is a list of criteria that needs your agreement in order to participate in this study.

1. Each of you are teaching two daytime sections of the same class in the Spring semester.

2. You will designate one section a NO FEEDBACK (NF) section and will use absolutely no Classroom Assessment Techniques (CATs) with that class for the entire semester.

3. You will designate the other section a FEEDBACK (F) section and will use frequent CATs with this section. Frequent means as many as possible, as often as possible. A minimum of one CAT is required every two weeks but we encourage you to use CATs as often as possible. You will use CATs with this group for the entire semester.

4. Each of you will schedule approximately 20 minutes of class time, during the tenth week of the semester, in each class involved in the study, so the CUCEI Inventory may be administered. You should establish the time and date with your researcher now. The Inventory is done anonymously, as are all CATs. Please inform your classes that someone will be coming in to do the survey.

5. If your college does not store and keep first census student lists, please make certain that you keep your copy.

Some demographic data will be collected relevant to the students participating in the study. However, the CUCEI Inventory will not be evaluated by individual or by school. Analysis will be by group (i.e. feedback group, no feedback group). No one person or school will be identified and all materials will be shredded after analysis has occurred.

If you have any questions and/or problems, please contact the researcher and/or director on your campus or call either Anita Catlin (707) 253-3135 of Michelle Kalina (916) 624-3333 X2274.

Please sign, detach and return this page to your CAP Researcher. Your signature indicates that you have read and understand the criteria necessary for maintaining the study's integrity and you agree to all the terms.

Signature

Print your name

School

Mail this to Anita Catlin, Napa Valley College, 2277 Napa-Vallejo Highway, Napa, CA 94558.

WHAT THE CATS RESEARCH SAYS TO US ABOUT WOMEN'S EDUCATION

by Lauren Coodley, Professor
Napa Valley College

The results of this reseach, which indicate "a very strong connection between the use of CATs and a positive learning experience for women...even more strongly for new majority women" offer fascinating validation of recent theoretical developments in the study of women and education.

Specifically, these research results can be analyzed from the perspective of the AAUW Report, How Schools Shortchange Girls;[1] from the work of Belenky, et.al., in Women's Ways of Knowing;[2] from the leading edge pedagogy which demystifies math for girls at the Equals Program, Lawrence Hall of Science;[3] and from the experiments in feminist education which have been quietly undertaken by thousands of instructors over the past few decades, discussed in such books as Theories of Women's Studies.[4]

As well as teaching women to overcome math anxiety for many years, I have also had the opportunity to teach the history of American women. I teach about Anne Hutchinson, the first American "women rebel," who was expelled from the church in 1636 for teaching women they could achieve salvation without church authorities. Anne began to preach the Antinomian philosophy which, reduced the powers of the ministers as intermediaries to God, and empowered the people, women as well as men, to develop a state of grace in direct communication with their Deity.[5]

Inadvertently or not, the developers of CATs have handed the nonvocal, well behaved, self conscious women students of today (especially those at community college, who have usually not experienced outstanding academic success) a tool that similarly empowers them and changes the shape of their educational experience.

From the AAUW Research Report, we have dramatic evidence that girls are overlooked in K-12 classrooms; that overwhelmingly, teacher attention goes to more vocal and demanding male students.[6] We know that women do not continue in advanced math and science classes past high school, nor do they imagine themselves becoming scientists and engineers--even those who succeed in these classes.[7] The consequences of the feminization of poverty, the inability of women to independently support their families, are well known. Thus, the price to young women of being docile, submissive and silent is high in the traditional classroom.

In Women's Ways of Knowing, Patricia Palmieri suggests, that "a better understanding of women's experience would permit, even force, a far-reaching revision of the broader fields of higher education and intellectual life in the United States."[8] Many women come to college uncertain of their abilities; "our interviews have convinced us

that every woman, regardless of age, class, ethnicity, and academic achievement, needs to know that she is capable of intelligent thought, and she needs to know it right away."[9]

Peter Elbow, quoted in Women's Ways of Knowing, comments that traditional professors..."stand up in front of students and say...get what is inside me inside you; listen to me; be like me; I am important." In contrast, he advocates competency-based programs where the teacher is more a "coach or an ally," where the teachers attempts to confirm the student as a knower.[10] The authors argue that "evaluation in the connected mode requires that the standards of evaluation be constructed in collaboration with students."[11]

The book goes on to propose a model of "the teacher as midwife" (rather than banker), who "assist the students in giving birth to their own ideas, in making their own tacit knowledge explicit;" who "focus not on their own knowledge, but on the students knowledge,"[12] and who "receives and accepts the students feeling toward the subject matter."[13]

Women have been particularly intimidated by and unsuccessful in math and science classes taught in a hierarchical, competitive, and isolated manner. Educators at the Lawrence Hall of Science, inspired by Sheila Tobias' blistering critique of traditional math instruction,[14] have pioneered cooperative group instruction in math, the use of journals, alternative assessment methods and real-world word problems to address this situation.[15] Although many secondary and college math instructors are not interested in these approaches, CATs enables formerly silent women students to "give voice" to their concerns and suggestions.

Educators influenced by feminist pedagogy have wrestled for several decades with the question of authority in the classroom, of student empowerment, of democratic structure which does not become the tyranny of the vocal minority. In CATs we have a system which is scrupulously fair and evenhanded, which mandates student input and yet leaves the instructor with the choices of when and how to utilize the information received. In a society where adult authority is still overwhelmingly male, where our educational institutions were designed by men, and where women are struggling on a daily basis with patriarchal power by fathers and husbands, there has been, invisibly, a "Chilly College Climate for Women."[16]

Although no assumptions were made about the effect of CATs on women students, although there was no specific hypothesis about the effect of CATs by gender, every instructor knows that most women are too shy to volunteer information or ask questions in a large classroom. By making everybody equal, by giving everybody a voice, the developers and users of CATs have levelled the playing field (to use a typically masculinist analogy). Small wonder that so many women walked out of church with Anne Hutchinson when she was told "You have rather bine a Magistrate than a Subject..."[17] With CATs, especially in the drastically underrepresented and well-paid science and math fields, women students enjoyed their new sense of entitlement in the classroom environment, according to the data represented in this study.

"Connected learning," as Belenky et. al., have titled it,[18] is effective with both men and women of all ethnicities. The results of this study should remind us that all things have not been equal in the college classroom, but that they can be equalized, with exciting potential for the development of the unused potential of our previously silenced students.

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[6]AAUW Report, op cit, Part 4, Chapter 2.

[7]AAUW Report, op cit, Part 2, Chapter 2.

[8]Belenky, op cit, pp. 191.

[9]Belenky, op cit, pp. 193.

[10]Belenky, op cit, pp. 208.

[11]Belenky, op cit, pp. 209.

[12]Belenky, op cit, pp. 217.

[13]Belenky, op cit, pp. 217.

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CLASSROOM ASSESSMENT PROJECT
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1992-1993
$92,213.00

No person shall on the grounds of sex, race, color, national origin, or handicap, be excluded from participation in, be denied the benefits of, or be subject to discrimination under this project.

92