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ABSTRACT

This paper examines current professional literature and assesses: (1) the degree to which community colleges have (or are developing) administrative programs that actively foster instructional innovation; and (2) how education programs in general, and innovative programs in particular are evaluated in terms of relative effectiveness and costs compared to conventional instruction. A case study of Coast Community College District (California) is presented: five broad administrative programs are discussed; cost comparisons are examined for different instructional programs; and three techniques of comparing instructional effectiveness, (normative, summative, and informal evaluation) are presented. The paper concludes that instructional innovation can be performed only by faculty members, but administrators are needed to provide an organizational environment receptive to and actively promoting innovation. A great need is seen for cost accounting systems to serve educational institutions. The summative method of evaluation is the most informative but also the most difficult to perform. A portion of this paper, Comparisons of Instructional Effectiveness, has also been processed as a separate document, (ED 050 712). (Author/CA)

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STRATEGIES FOR CHANGE

A Case Study of Innovative Practices

at the

Coast Community College District

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May, 1971

ABSTRACT

This paper examines current professional literature in the field of education and assesses the degree to which community colleges have developed or are developing administrative programs that actively foster instructional innovation. In addition, literature is reviewed to determine the degree to which educational programs in general and innovative programs in particular, are evaluated in terms of relative effectiveness and relative costs as compared to alternative methods of instruction usually refered to as "conventional instruction".

The paper also presents a case study of the Coast Community College District's accomplishments at developing administrative programs that foster instructional innovation as well as evaluative efforts in assessing their results. Five broad administrative programs are discussed. These include large group instruction, the Office of Educational Development, the Faculty Fellowship Program, the Summer SAL Program, and Project FUSE. Cost comparisons were examined for auto-tutorial laboratories in Biology and in Remedial English, large group instruction for Psychology 1A and for Cultural Anthropology. Three techniques of comparing instructional effectiveness are presented. The first of these, the normative technique in examing the relative performance of students in freshman composition as measured by grades and attrition rates. Summative techniques of evaluating instructional effectiveness are examined for computer assisted instruction in two diverse subject matter areas: computer operation and law enforcement. Finally three examples of informal evaluation relying on student opinionnaires and instructor observations are presented. These include evaluations of sound-on-slide systems, of a mathematics tutorial center, and of a media production for medical-surgical nursing.

In terms of administrative programs for innovation, the paper concludes that community colleges as with all educational institutions, have considerable more work to do than has been done. Instructional innovation can only be performed by faculty members. Administrators face a binding responsibility to provide not only an organizational environment receptive to innovation, but one that actively promotes it. In terms of cost evaluation, the paper points out the overwhelming need for cost accounting systems serving educational institutions. At the present time there is no adequate way to assess all costs associated with any instructional program. As for evaluating instruction, the paper observes that the most informative method, the summative system, is the most difficult to perform and requires the most rigorous control of student group selection, instructional systems design, and evaluation techniques. These difficulties coupled with a general faculty reluctance to use students as guinea pigs makes the task of rigorous analytical instructional evaluation most difficult.

The paper recommends that additional research into whether or not community colleges face difficult problems in designing and implementing instructional systems need not be done. Instead there is a great need to experiment with and to evaluate new instructional systems. This can be done only if college administrative practices are such that innovation is at least as important as the organization of regularly scheduled conventional instruction.

Table of Contents

STRATEGIES FOR CHANGE

It's pretty hard these days to pick up a professional publication in the field of education without finding reference to the current crisis facing educators. This crisis has two major aspects. First, educational institutions face burgeoning enrollments and have constricting financial resources. In the Fall of 1970-71, approximately 7.6 million students were enrolled in degree/credit programs in institutions of higher education. This figure represents an increase of about four percent over the 7.3 million students enrolled the previous Fall (Grant, p. 13).

Enrollment growth is bound to continue. Nearly three million persons graduated from high school in 1970 and the class of 1971 is expected to reach 3,100,000. This would be the largest graduating class in history. If present trends continue, about 22 percent of these graduates will earn a bachelor's degree. This means that we can expect about 45 percent of all high school graduates to enter a degree program in a college or university in the Fall of 1971-72. Thus, about 1,400,000 students will enter institutions of higher

education for the first time in the Fall of 1971. This is the largest entering group of young people the nation's colleges have ever seen. (Grant, p. 15.) Enrollment projections show total undergraduate collegiate enrollment at 9,435,000 by the Fall of 1979, of which 2,446,000 will be enrolled in junior colleges. This amounts to a 50 percent increase enrollment for all undergraduate programs and a 48 percent increase in enrollment for junior colleges over the Fall 1969 enrollment figures (American Council on Education, American Council on Education Fact Book, p. 71.5). Moreover, as enrollments grow, costs per student have increased rather than decreased. In 1967-68, public universities and colleges spent $2,814 and $1,252 respectively per student. Private universities spent $3,771 and United States public junior colleges spent the least with an average of $667 per student (U. S. Office of Education, Financial Statistics of Institutions of Higher Education). There is little question in the minds of educators today that the combination of increasing enrollments and reducing funds available per student comprise a crisis of major proportions for education as a whole throughout the country.

The second aspect of the current crisis in education has to do with bringing about change so as to make education more relevant, more effective, more desirable, in short, more worth the money that the American public is putting into it. As President Nixon put it,

> "We must stop congratulating ourselves for spending nearly as much money on education as does the entire rest of the world--65 billion a year on all levels--when we are not getting as much as we should on the dollars we spend. (Nixon)

PURPOSE AND THESIS

The purpose of this paper is to describe the activities of one community college district in actively promotinginnovative efforts on the part of its faculty as a step toward solving its local crisis in burgeoning enrollments and financial shortages. In addition, this paper serves the purpose of examining the degree to which instructional programs resulting from innovative practices at the District are more or less effective than alternative strategies, and the extent to which they are more or less costly than alternative strategies.

The paper addresses the broad thesis that community college administrators, in addition to loud protestations that community colleges are at the fore-front of instructional innovation today, must also provide the administrative and organizational leadership necessary to induce faculty members to engage in innovative teaching practices. It is not enough for administrators to be receptive to change, they must seek it out.

This paper serves as a case study of the Coast Community College District in its efforts to go one step beyond the administrative postures taken by most other community college administrations. These postures welcome innovation. The Coast Community College District aggressively seeks it out.

METHOD

Literature Review

In examining the basic thesis that community college administrators are more receptive to innovation than aggressive toward seeking it, a rather extensive review of the current literature has been conducted. This review is reported in the next section of the paper.

In general, the review seeks documentation of specific efforts on the part of community college administrators to so modify their college organizations or administrative patterns as to actively induce and promote faculty innovative efforts. The literature will also be reviewed for evidence of rigorous evaluation of innovative developments in terms of relative effectiveness of instruction and in terms of relative costs of instruction.

As a case study of a community college district actively striving for instructional innovation, this paper will review five well-defined administrative programs at the Coast Community College District. These programs all work to stimulate District faculty members to engage in innovative efforts in designing new learning systems. In addition, the paper will review individual faculty projects and individual action plans formulated and executed under the various administrative programs. These individual efforts are each briefly described in a set of appendices to the paper.

Evaluating Costs

The paper will also report initial efforts at comparing instructional costs of a number of innovation instructional systems developed under the administrative programs. This is not to say that the paper will complete a thorough and detailed analysis of the cost effectiveness of any particular learning system. It will analyze available costs and it will make rough comparisons of costs of certain learning systems with the costs of alternative learning strategies broadly classified in this paper as "conventional instruction". By conventional instruction is meant the type of instruction one normally has found in college classrooms for the last several decades. This learning

environment consists of a number of chairs, usually ranging between 30 to 50 though often more, all facing one wall of the room at which stands, perhaps behind a podium, the instructor for the course. Time spent in this facility, on the part of the students, is devoted to listening to the instructor explain and expound upon the subject matter being taught. Some variations of this basic theme are occasionally found. These include watching movies, group discussions led by the instructor, and guest lecturers. The difference between conventional instruction and the innovational practices described in this paper lie chiefly in terms of what students do. Without exception, the new or innovative instructional practices reported in this paper and on which most of the Coast Community College District's efforts are focused, all are characterized by a high degree of subjective student involvement in the learning process. This is substantially different from the conventional passive student involvement of listening to a lecture, watching a movie, or reading a text book.

Evaluating Effectiveness

Finally, this paper will report a number of District efforts at comparing the relative effectiveness of their innovative learning systems with more conventional teaching practices. These comparisons are typically of two varieties. In the first, a comparison of student performance between one instructional stragegy and another may be done using student grades as the criterion for measuring changes in performance. This is known as the normative method of measuring student performance and, by and large, this technique receives most attention by educators today. A second evaluation technique draws upon student opinions to inform educators as to whether or not an

instructional program is more or less effective than some other way of doing the same basic job. This has been called, for the sake of this paper, "informal evaluation," although the specific techniques of analysis may be quite formalized indeed. Finally, and this has been of most interest to the District, evaluation of alternative instructional plans may be made by comparing the degree to which students meet specified behavioral objectives as measured by a well-validated examination. This last, of course, is the most difficult to conduct.

As one would expect, a great number of problems arise in determining the cost and effectiveness of instructional programs. This paper treats those two determinations as discreet elements of the total task of evaluation. In discussing the Coast Community College District's efforts at evaluating costs and effectiveness, much attention will be paid to bringing to light those aspects of cost and effectiveness measurement that promise to be the most troublesome for educators.

This paper certainly does not promise to provide its reader with the final answer in how to inspire faculty members on to bigger and better instructional innovation nor will it provide any final and absolute answers in evaluating instructional programs from either an effectiveness standpoint or cost standpoint. It will, one hopes, provide some insight into the kind of administrative programs that do in fact inspire faculty members to innovate and will uncover some of the most vexing problem areas of evaluating instructional effectiveness and of cost analysis.

CURRENT LITERATURE

Stanley Ikenberry at the Center for the Study of Higher Education at Pennsylvania State University outlines three forces moving for change in education at the present time. The first of these is the decline in public confidence in higher education and a tightening of the purse strings. The second has to do with the loss of confidence on the part of students that their educational experiences are worth while. Thirdly, Ikenberry discusses public demands that higher education serve the needs of the total population instead of concentrating on those who are intellectually, socially, and economically of the middle and upper middle classes (Ikenberry, p. 77).

CHANGING INSTRUCTIONAL METHODS

This paper is interested in the second of Ikenberry's three forces, namely, that of satisfying the need for change in higher education in terms of how it serves students. Such change has two important elements: change in what is taught, and change in how it is taught. Of primary interest here is consideration of how students are taught, that is, the consideration of the

pedagogical techniques employed by higher education, and, in particular, employed by community colleges.

In addition, of course, some evaluation of the relative effectiveness of these instructional techniques is in order. Preliminary evidence is not encouraging at all. A report by the Center for Advanced Study of Educational Administration had this to say:

> Given a population of seven million adults or near adults attending two and four year colleges and universities as students what can we say about the relations among various methods for instruction...? We are able to state decisively that no particular method of college instruction is measurably to be preferred over another when evaluated by student examination performances. We may also conclude that replication of the 91 studies examined in detail in this survey would not produce conclusions different from ours. Any future research on comparative teaching methods at the college level must move in new directions (Dubin and Taveggia, p. 10).

Both McKeachie and Bloom, writing earlier, arrived at similar conclusions (McKeachie and Bloom, pp. 211-21).

Despite this gloomy initial evidence to the contrary, one would hope that different instructional strategies would yield different results, depending upon the subject matter and upon the students studying it. One of the limitations of the study done by Dubin and Traveggia has to do with evaluating students in a normative fashion rather than evaluating them in terms of meeting educational objectives. Normative evaluation techniques are cited by Ikenberry as an important, troublesome characteristic of conventional higher education instruction.

> Although colleges can compare students with each other, they have been unable to define student progress in terms of any explicit performance standard or criterion. (Ikenberry, p.78.)

ADMINISTRATIVE ORGANIZATION

This paper concentrates on formalized, administrative programs designed to promote change in the way education is conducted at community colleges, and upon those few efforts that have been expended toward evaluating the new instructional techniques that have resulted from the administrative efforts at the Coast Community College District. In reviewing the current educational literature, we ask the question "To what degree are professional educational administrators actively promoting changes in instructional techniques, and to what extent have these new techniques, once developed, been found to be more or less effective than what may best be described as conventional instruction?"

Turning first to the matter of administrative organization for innovative activity, one is tempted to look no further than the article by Richard C. Richardson in the Junior College Journal for March 1970. Richardson has this to say:

> A review of journal articles for the past three years reveals that only one of them deals authoritatively with the question of administrative structure or administrative concepts, other than those relating to faculty or student involvement in policy formulation. As a matter of fact, the question can legitimately be raised as to whether a science of administration may be said to exist with respect to two year colleges. (Richardson, p. 16.)

Although Richardson's article focuses more upon the relative power of faculty groups and professional administrators, his review of the literature suggests that power relationships and organizational structure matters have been a major point of concern in most writing dealing with the administration and organization of community colleges. This is certainly true of his article. Richardson's admonition that "We must understand that the role of the

administrator is drastically changed if we accept the hypothesis that authority is delegated upward rather than flowing downward," illustrates his mind set towards the notion that the exercise of authority by college administrators is the most pressing administrative concern today. (Richardson, p. 18.) However, the sample organization charts offered by Richardson in this article show a third-level dean of technology and development presumably responsible for promoting innovative efforts on the part of the college staff. Organizational positions reporting to the dean of technology and development, however, denies this presumption. There are two of these, the Director of Institutional Research and the Director of the Computer Center. Neither of these titles suggest that much emphasis in this organization would be devoted towards the stimulation of innovative efforts. Under the Dean of Instruction, Richardson shows a programmed materials learning lab. It would seem, then, that programmed learning, as conducted within laboratory environment, is assumed by Richardson to be an effective enough learning strategy to justify its continued and unquestioned operation within the regular framework of instructional activity.

Thirteen months after the Richardson article appeared, Charles Atwell and Foster Watkins felt moved to offer additional comments on Richardson's theme (Atwell and Watkins, p. 17). These men offer only a modicum of solace to reluctant junior college adminstrators who face the prospect of increasing faculty and student involvement in the yielding of authority within their organizations. In this respect, they take up the humanistic cry advanced by McGregor, Maslow, and others who have been concerned with human needs within an organization as opposed to the more autocratic stand formulated by

Frederick W. Taylor. Like Richardson, these men are more concerned with administrative structure, qua structure than they are with the purpose to which such administrative structure might move in terms of improving the instructional techniques of the colleges they serve.

One investigator has uncovered evidence that certain interpersonal relationship variables within the organizational climate may be among the most important in terms of initiating and maintaining innovations in educational organizations.

> The long term success of school system innovative efforts may be due to a greater degree than previously suspected to the social--psychological state of the systems organizational climate. If it becomes possible to consistently diagnose and evaluate the state of the school systems organizational climate, it might be feasible to modify the adaptability of professional personnel and to change or create organizational structures and processes which tend to enhance the possibilities of successful, institutionalization of innovations. (Hilfiker, p. 27.)

Hilfiker's study suggests that college administrators can indeed devise an organizational structure that will be conducive to instructional innovation. This study was concerned exclusively with the examination of a number of interpersonal relationship variables as they relate to innovativeness. These variables included (1) social support provided by the principal as perceived by the professional personnel; (2) the perceived problem solving adequacy of staff meetings; (3) satisfaction with the amount of time devoted to problem solving in staff meetings; (4) perceived powerlessness in the system, and in faculty, and administrative council meetings, combined as a single variable, and (5) openness and trust as inter-personal process norms of the system as perceived by the professional staff. This paper is more concerned with aggressive, administrative activities and programs specifically designed to

promote innovative development on the part of faculty. There is no question that the degree to which such administrative programs will be successful will depend greatly upon the variables studied by Hilfiker. As Bannister observes,

> No forward looking administrator can suddenly institute a multi-media system since people with established values and feelings are involved. A careful study must be made to determine the best strategies for change. (Bannister, p.15.)

Administrative Programs for Innovation

Opportunities for invention are many it would seem, however, those who would take advantage of them are far and few between apparently. As Glazier has observed,

> Community colleges, in general, have tended to stay well within the boundaries of current educational practice and procedure. Frequently described as flexible, dynamic, new and responsive, the junior college does not often actually fit that description. (Glazier, p.14.)

Similarly, Johnson reports the results of an exploratory national survey, studying the utilization of junior college faculty services. "It is clear that junior colleges, in general, are doing little experimentation in the effective utilization of faculty services." (Johnson, p.45.)

Despite widespread tongue clucking at the paucity of aggressive administrative programs to stimulate faculty invention, few administrators have really gone to bat. Initial stirrings are becoming evident however. In the Junior College District of St. Louis, one dean refers to his college as one exhibiting a "climate for innovation" in which "teaching is the status of the school". This junior college district has set aside four percent of the total faculty salary budget for released time for its teachers, this time to

be used for research and development, not into esoteric academic subjects, presumedly, but rather into improved instruction (Salus, p.27). Professor Cohen's crystal ball gazing into the community college of 1970 conjures up administrators in charge of public relations, faculty personnel, and money getting, but no administrator or no well-defined administrative program devoted to promoting the very innovative practices that Cohen foresees characterizing community colleges a decade from now (Cohen, 1969, pp. 38-39).

Cohen's monograph "Institutional Administrator or Educational Leader?", however, discusses the role of community college administrators as those

> responsible for creating an organizational structure that makes ample provisions for and encourages innovative thinking, experimentation, and educational development (Cohen, 1968, p.11).

In asking the question "Who shall education?", Cohen has this to say about community college faculties:

> Those who represent and speak for various faculty organizations suggest that it is the faculties who will furnish the leadership for improved educational practices in American higher education. However, a major departure from the current faculty outlook will be necessary if the prediction is to be substained (Cohen, 1968,p.27).

He goes on to point out that

> Faculties are fundamentally resistant to any change. From the time of the mid-evil universities, professors have tended to go on doing things in same old (presumedly) time-tested ways (Cohen, 1968, pp.27-28).

It is clear that Cohen looks upon high level administrators as the major agents for change in the community college. As for presidents he says,

> The president must ultimately accept responsibilities (and be accountable) for bringing about educational changes in his institution. The setting is right for him to be the leader. Research has shown that changes in organization frequently come from the top down. (Cohen, 1968, p.29).

Of course, one cannot expect the president, or any other top administrator for that matter, to do the innovative work themselves. It's hard to imagine a dean of instruction preparing an auto-tutorial system for teaching anatomy and physiology and delivering the new system to the biology department of his college with the admonition that they should put it to work. At best all an administrator can do is to pursuade faculty members to do this kind of work themselves. Cohen recognizes the problem. He warns against junior college administrators serving as managers as opposed to leaders. The leader, he asserts, is one who does in fact induce faculty members to involve themselves in innovation development. The dangers are great: "A president can make a career of managing (administering) and never get around to leading. Sad to relate he may not even realize he is doing one and not the other" (Cohen, 1968, p. 30).

The literature is not utterly devoid of reference to specific administrative efforts to encourage faculty innovation. Brown and Thornton, writing in 1963, devoted a chapter of their book New Media in Higher Education to the subject of the administration of new media. This chapter reports a number of studies examining reasons why the introduction of new media into higher education is difficult, and some organizational and reorganizational efforts of a number of different colleges designed to make the use of multimedia instruction easier. As a rule, these studies report programs that are oriented towards a specific kinds of instructional media, say, programmed instruction, telecommunication, auto-tutorial laboratories, or whatever. (Brown and Thornton, pp. 138-63).

In general, discussion of innovative developments at the community college is limited to consideration of specific innovative projects and ignores broad

administrative programs that foster all sorts of innovative efforts. For example, the Junior College Journal issue of December-January, 1969-70, is devoted to a listing of innovation practices exercised by member colleges of the League for Innovation in the Community College. All in all, dozens of innovative programs in some 13 different community college districts are discussed in this issue. Only two of the community college districts reported administrative programs fostering innovative practice. These were the Los Rios District, which sets aside a special budget for innovative projects, and the Santa Fe District, which has established a research and development office. This is not to say, of course, that the other community college districts do not have administrative programs fostering innovation. In fact, the Coast Community College District, also represented in that issue of the Junior College Journal, confined itself to listing specific innovative developments without describing a number of the more important, administrative programs under which these developments took place. It is the purpose of this paper, of course, to describe these administrative programs.

B. Lamar Johnson, in Chapter 14 of his Islands of Innovation Expanding describes community college activities more closely akin to ongoing, aggressive administrative programs promoting innovation. Visiting centers of innovation, attending educational conferences, reading, are all examples of more passive aspects of this type of activity. Also, these activities are often one-shot in nature as with the San Joaquin Delta College plan which sent faculty to two-day conferences on three different campuses (Johnson, p. 264). From the faculty point of view, these affairs are stimulants to provide him with ideas of new instructional techniques and hopefully the

motivation to do something about it when he gets home. Other more ongoing and more aggressive activities include introduction of agents of change or, as Johnson puts it, "Vice Presidents in Charge of Heresy." So, too, budgeting, the development of special facilities for teaching, in-service training programs preparing faculty to use new instructional techniques, and the organization of experimental junior colleges, all represent initial movements towards administrative programs designed to inspire innovative work on the part of faculty. Combined with the selection of faculty who are particularly interested in doing this developmental work, such administrative programs, will likely bear fruit in the immediate future.

Nevertheless, the conclusion must be drawn that by and large, community college administrators are more concerned with the development of specific innovative instructional tricks than they are with providing an administrative framework in an organizational climate that inspires faculty members to innovative efforts. Innovative postures of community college districts, as described by the administrators who prepared the articles appearing in an issue of the Junior College Journal, amount, usually, to letting faculty members innovate as opposed to inspiring them to do so. Johnson and Howe, writing the introductory article to the December, 1969 issue of the Junior College Journal, report that

> League colleges use a variety of plans to encourage and support innovation and experimentation. Especially significant are those that provide released time during the college year or provide for summer employment of faculty members to work on plans for new developments. Other plans which encourage innovation include a student-operated experimental college, faculty visits to centers of innovation, and the generous provision of varied multi-media aids to learning as a means of stimulating creativity in teaching. (Johnson and Howe, p.11).

While applauding these things as surely important and significant in terms of the encouragement of faculty innovation, they, nevertheless, do not constitute aggressive administrative plans. Instead, it seems to this writer, they express a receptive administrative attitude towards those faculty members who will come and ask for support. This is quite different, of course, than an administrative program that aggressively seeks faculty members who will do innovative work.

EVALUATING COSTS

Probably the most intriguing aspect of evaluation has to do with comparing relative effectiveness of particular educational programs with the costs of conducting the program. These considerations are usually called either cost effectiveness or cost benefit analysis, although this writer prefers to distinguish between the two terms as follows. Cost effectiveness refers to a ratio of costs to educational effectiveness as measured by the achievement of a specific educational objective. Thus, one presumably could prepare a program, as did Fagin, to teach young boys how to pick pockets. The program could be evaluated as very effective and perhaps could even be considered, in terms of Dickens' description, as rather low-cost as well. The cost effective relationship, then, of this educational program is pretty attractive. In terms of cost benefit, however, it does not come out quite as good. The benefits of having a pack of young urchins picking pockets throughout the street are doubtful at best. However low the costs may be in training these boys, the benefits that derive are hardly worth assessing. In more down-to-earth terms, it is much easier to assess the effectiveness of an educational program than it is to assess the benefits of conducting it.

We can measure, if we try hard enough, the degree to which a particular educational program is effective in meeting objectives. Whether once achieved, those objectives really yield positive benefits either to the learner or to society is quite a more difficult question.

Cost benefit analysis is most often performed in terms of the expected economic return on the investment in human capital. This kind of cost benefit analysis has had a long history in economics but, with few exceptions, its application to education has taken place only since 1962. (Coster and Ihnen, p. 423.) Usually this type of imperical research limits itself to determining the effects of educational investment on economic growth in general, or of growth of a specific economic sector such as agriculture or manufacturing. It also considers the rates of return both to the ex-student and to society of alternative levels of schooling. (Coster and Ihnen, p. 423.)

This paper, however, is more interested in the relative costs of different instructional strategies attempting to teach a given subject matter. Holding constant for the sake of analysis, the relative effectiveness of the two instructional strategies, we are interested in the question of which of the strategies is least expensive. This is an important question, particularly for public schools as they face a growing economic crisis. Most recent efforts at developing costs of educational programs concentrate on allocating costs to each educational program in a particular school system. Wattenbarger, Cage, and Arney recently produced a report entitled The Community Junior College: Target Population, Program Costs, and Cost Differentials. In this report, the authors outlined a mehtod to be used in allocating costs of operating a community college to various educational programs conducted by the college.

(Wattenbarger, Cage, and Arney). Similarly, Heinkel and Klampe, both of the San Diego Community Colleges, have developed a cost accounting model for vocational and nonvocational courses. This model, as does the Wattenbarger model, allocates costs of operating community colleges to each of the various educational programs in the college. It's one thing to devise a method of allocating costs to educational programs. It's quite another to devise a cost accounting system, taking the form of a chart of accounts, that gathers expenditures and cost information as the programs are conducted. This, of course, is one of the major features of most proposals for planning programming budgeting systems. (Pardon.) The need for a cost accounting system that records school expenditures by educational programs is sorely needed, particularly by junior colleges. There is no way to answer questions regarding accountability without the ability to analyze costs of the various programs the school offers. So-called budgeting systems now used by colleges keep track of expenditures usually for the entire institution. As a result, efforts of Heinkel and Klampe, and Wattenbarger, are necessary to try to force the resulting aggregate numbers into specific costs per program. The results are an accumulation of cost figures which may or may not be meaningful.

> Public school systems have developed extremely precise methods of accounting. Most of them can tell you to the penny how much they spent for teachers salaries, text books, red and blue litmus paper, and the wax on the gymnasium floor, but they cannot tell you what this investment produced. All focus in educational accounting has been on input, not output... Per pupil expenditures do not really tell us what it costs to educate a student. All they tell us is what it costs to keep the student seated for a year. (Nolan and Waldrip, p. 3).

Finally, what work has been done in cost analysis of educational programs typically ignores a most important aspect of cost accounting. This is the

concept of differentiating between variable and fixed costs per unit. For example, Evans and Hicks, in preparing a monograph entitled "An Approach to Higher Educational Costs Analysis" have this to say:

> It appears to seem quite reasonable to a legislator that if it costs x dollars to educate a student, and we expect to have y number of students, then we require xy dollars to get the job done. It gives members of our general assembly and state budget department something to hang their hat on and this is important. It makes us appear business-like, a trait in line with the American tradition of efficiency. (Evans and Hicks, p. 25).

Earlier in their monograph, the authors suggest that

> If it could be shown, for example, that expenditures were $500 per year in one university for each student, and if the that institution expected 10,000 students in a given year, then its need for that year might be said to be 5 million dollars (p.4).

We really need to do better than this in terms of cost analysis. We need to analyze school costs in terms of both fixed and variable components as Evans and Hicks point out in a sentence almost hidden near the end of the book: "Much could be said about the technical shortcomings of the costs we have developed to date or the fallacies considering such costs functions to be linear in nature" (p.26). This observation coming on page 26 of a 26-page monograph does not deter the authors from analyzing the costs at three mid-western universities in terms of total costs per student with the clear presumption that increasing the number of students would increase costs of operation by just that number times the dollar figure per student to treat each one during the year.

EVALUATING INSTRUCTIONAL EFFECTIVENESS

Whether or not we are getting our money's worth out of the amounts we spend for education depends, of course, upon what our educational institutions produce. Although much attention is focused these days on the economic arguments for increased investment in education, there seems to have been little research as to the dollars and cents productivity of the education system, and even less as to the relationship between costs and output. Measuring productivity requires quantified definition of inputs and outputs and is most difficult for educators to prepare. A study group of the Organization for Economic Cooperation and Development has discussed the problems involved in measuring productivity of higher education (OECD Study Group). Some investigators suggest evaluating educational output in terms of lifetime earnings of those who leave school (Welch). Others have concentrated upon the relationship between school size and costs per student or cost per student hour of instruction (Riew).

Recently, attention has been focused upon holding educators accountable somehow for what their institutions produced in terms of student ability and performance. The entire March 1971 issue of the Junior College Journal, for example, is devoted to issues involving accountability. In the last few months literature is replete with sanctimonious calls from tax-sensitive politicians for holding our schools accountable for what they do. Similarly, most professional journals in the field of higher education have shown a rash of articles and publications dealing with the issue of accountability and what educators should be accountable for and how they will justify their educational programs.

In Arizona, several school districts have banded together to set up a program they call the EPIC (Evaluative Programs for Innovative Curriculum) Evaluation Center. The center employs some 21 staff members with backgrounds in systems analysis, evaluation design, behavioral analysis, and computer programming. It assists in the evaluation of educational programs, and helps teachers learn about using the results in terms of improving them. Going a step beyond merely evaluating the degree to which Title III ESEA projects meet their objectives, the EPIC staff members teach Arizona teachers to write percise objectives for their classes. This is evaluation in the best possible sense of the word, the kind of evaluation in which the evaluator is involved in development of those objectives to be evaluated. (Iwamoto and Hearn, p. 18)

Accountability implies not only evaluating programs but evaluating them in terms of certain cost effectiveness or cost benefit relationships. John Roueche, writing in Educational Technology, offers a plea for community colleges to accept the responsibility for evaluating the degree to which they meet their objectives.

> The concept of accountability suggests that we stop counting the number of volumes in the library, quit measuring the square footage per full-time student, and immediately start looking at how well students are being taught (Roueche, p. 46).

Earlier in this review, a study by Dubin and Taveggia, was cited as providing evidence that no particular method of instruction is measurably to be preferred over another, that is to say that all types of instruction seem to work out about the same in terms of effectiveness. Such preliminary findings should not, of course, deter educators from assessing the relative value of their instructional methods. In view of the basic weakness of Dubin and Traveggia's study, that is that their evaluation measures were normative

as opposed to criterion based, one would suspect that given specific educational objectives and reliable instruments to measure the degree to which the objectives were met, one particular kind of instructional technique will be more or less effective than other kinds, depending upon students, subject matter, and other variables.

Judging from the studies of some others, if educators are not deterred from evaluating innovative programs because of such preliminary evidence as uncovered by Dubin and Taveggia, then there must be some other reason for them not evaluating their programs. As Miles points out, "Educational innovations are almost never evaluated on a systematic basis." (Miles, p. 657).

Organizing his comments along lines used by Scriven, (Scriven, pp.39-83, 40-43, and 62-66) Johnson reports a number of formative and summative evaluation efforts in his book Islands of Innovation Expanding (Johnson, pp. 307-10). Three of the many community colleges discussed in this book are reported as having used normative evaluations. These are the Loop College of Chicago City College, The Burrough of Manhattan Community College, and Miami Dade Junior College. Quite a few more have made use of summative evaluation, the evaluation technique of most interest in terms of the present paper. This technique compares one instructional method with another and tries to arrive at conclusions as to the relative effectiveness of each. Johnson reports 12 different colleges that have made use of this evaluation technique. In terms of the apparent paucity of evaluation efforts reported earlier in this paper, this is good news. However, in terms of the total number of community colleges engaged in innovative practices, the news appears less wonderful, and, in terms of all the community colleges offering instruction in the United States, it is hardly worth talking about.

Despite the obvious need for evaluation of innovative efforts, and despite the general outcry for educational evaluation and for accountability in general, it is surprising how much literature is devoted to describing new things that colleges and other schools are doing, but which, at the same time, says practically nothing about efforts at evaluating these new things in terms of educational effectiveness. For example, Volume 1 of a report by the Commission on Instructional Technology of the Department of Health, Education, and Welfare, published in 1970, spends 395 pages discussing matters involving instructional technology in general and outlines the details of some 22 specific innovative projects undertaken by a number of different schools. Not a word is devoted to rigorous evaluation of the technological development described. (Tickton). To be sure, student opinion is often solicited and is all too often used as the chief modus operandi of evaluation efforts. "Most of the students questioned had a positive attitude, not only towards the showing of film, but also any discussion which followed." (Tickton, p.217).

We can expect the picture to change with regard to evaluation rather quickly. As Stanley Krueger reports in American Education

> One of the newer techniques for promoting educational accountability is educational program auditing. It is now being tried in 86 projects under the bilingual education and dropout prevention program authorized by Titles VII and VIII of the Elementary and Secondary Education Act. The technique, in short, measures a project's actual performance against the educational objectives it has set for itself. (Krueger, p. 36).

Krieger goes on to observe, however, that

> At present very few school systems are actively searching for educational program auditors to audit their evaluation procedures. In fact, most schools have not begun implementing significant evaluation programs at all (Krieger, p.36).

Olson and Marvin discuss Illinois procedures in evaluating Title III ESEA projects. To do this, Illinois established a number of regional consultants who developed models for on-site evaluations at each individual project at 55 different schools. This model provides for structural interviews and analysis that would get answers to such questions as "To what extent are the projects meeting their stated objectives?" and "What major weaknesses or inhibiting forces have been uncovered?" (Olson and Marvin, p.33).

Although these initial steps toward making evaluation a reality in the community colleges, as well as in other educational institutions, give cause for hope, a chapter appearing in the Review of Educational Research for August 1968 brings a sobering thought. This chapter reviewed research related to contributions that various educational media make in terms of achieving educational objectives.

> 'There is little evidence to support the concept that given media, qua media contributes more or better learning than do other media; i.e., there is no evidence as to what or how much is learned in non-media situations' (Edling, p. 189).

In this article, the author reports that research and development activities involving instructional media helped clarify educational objectives and contributed to the analysis and design of media that produced specific learner behavior patterns. Furthermore, these evaluation efforts provided a modicum of feedback and helped to develop more predictable learning experiences. Most of all, Edling found evidence that evaluative research will provide new potentials in terms of determining whether or not educational objectives are being obtained.

SUMMARY

The current crisis in education, as expressed in recent literature, suggests that major changes in curriculum and in instructional technique are in order, particularly for higher education, and for community colleges especially. Recent writings dealing with innovation and the inducement of community college faculty members to engage in it suggest that, by and large, community college administrators consider themselves progressive if they are receptive to proposals made to them by faculty members for the execution of innovated projects. Little has been reported in terms of aggressive administrative programs designed to goad, wheedle, and otherwise route faculty members along the road of change in instructional strategy.

Despite widespread literature regarding innovation and specific innovation projects, as found in such magazines as Telecommunications, Media, and Instructional Technology, relatively little is reported with respect to evaluating the relative effectiveness of any one particular innovative teaching technique as compared to any other. Moreover, what evidence is available suggests that it really doesn't make any difference. There is good reason to think however, that this evidence can be discounted inasmuch as it depends heavily upon normative evaluative data as opposed to the type of evaluation that measures the program against its specified educational objectives.

Finally, evaluation to be most meaningful must be made within the constraints of a given financial structure for the educational organization.

In order to perform this kind of evaluation, it is most necessary for colleges to have a cost accounting system that allocates aggregate expenditures to instructional programs on a direct basis as opposed to methods and formulas, however well reasoned, that allocate total costs to all of the instructional programs at the college.

ADMINISTRATIVE PROGRAMS

This portion of this paper describes various administrative programs at the Coast Community College District. It forms the heart of the work as far as the author is concerned. Whatever techniques are devised to evaluate instructional effectiveness and instructional costs, the fact remains that it is first necessary to devise instructional systems to evaluate. Most educators are convinced, intuitively if not on the basis of empirical evidence as well, that the manner in which instruction is now conducted in American colleges leaves much to be desired. If these educators listen to their students, their beliefs in this regard are reinforced. The essential problem, then, in meeting the current crisis in education is finding better ways to get the job done. Evaluation techniques, nonetheless important of course, are relevent only to the extent that they help us determine which of the various ways we devise are more desirable in terms of the goals and directions of our educational institutions.

This section presents a narration of five specific efforts on the part of the Coast Community College District to incite its faculty to bigger and better things in terms of the design and implementation of new instructional methods. These, then, are the strategies for change thus far adopted by the Coast Community College District.

LARGE GROUP INSTRUCTION

Large group instruction is the first effort of the Coast Community College District to introduce new teaching techniques into the college environment. This introduction was made in the Fall of 1957 at which time the community college district was served only by Orange Coast College. The college had something less than 1,500 students then and even in the comfort of this relatively small student enrollment* the president, Dr. Basil H. Peterson, forsaw the need to introduce more effective instructional techniques into the college program.

The first large group instruction experiment was conducted by one Dr. Giles Brown, now Dean of Graduate Studies at California State College at Fullerton. Dr. Brown undertook to teach American History in the following manner. Students enrolling in American History would attend lectures two hours a week in a large group consisting of 90 students. This large group of students met in a music room with 90 seats, the largest facility available at the time save the auditorium with a capacity of 1,200. In addition to listening to lectures twice a week, students would gather as members of small

* Almost 27,000 students were enrolled at the Coast Community College District in the Fall of 1970-71. Over 17,000 of these were Orange Coast College students.

seminar groups of 15 to 20 students each. There they would discuss with an invididual faculty member the material presented in the large group lectures and would take periodic one hour examinations. Students were admonished that the one-hour seminar sessions per week were not in fact quiz sessions and to reenforce the idea quizes were administered at the large lecture group itself. In the large group, the lecturer made use of some audio-visual devices and considerable handout materials. An overhead projector was used to show illustrations, maps, charts, and other graphic materials and in addition, each student was provided with an elaborate course outline which amounted to an articulation of the lecturer's presentation in written form. Students would listen to the lecturer and fill in blanks deliberately left in the outline so as to complete his lecture notes. He was spared the time and efforts of drawing pictures, graphs, and other charts and maps as these were provided for him in the lecture notes. Students did not buy the lecture notes. They were passed out in class periodically as the course moved from one topic to the next.

This system met with considerable success. It was warmly received by students and faculty members alike and especially by those directly involved. The program was viewed as effective as conventional instruction and showed evidence of being even more effective although rigorous analysis of the comparative effectiveness of conventional instruction verses this large group instruction was not conducted at that time. As a result of this initial enthusiasm, Orange Coast College undertook to build a facility specifically for the purpose of conducting large group instruction. This facility, known as the Forum, was completed in 1962 and has a capacity of 300 students. It is

equipped with a wide variety of audio-visual devices all under the control of the teacher at the podium and has facilities for film projection, closed-circuit television, and other aids.

Since the completion of the Forum at Orange Coast College, the District has gone on to build still other large group facilities. These include four classrooms at Orange Coast College each with a capacity of 90 students (the smallest number of students qualifying as a large group instruction class for the purposes of this paper), a library classroom with 183 seats and a new science hall with the capacity of 375. At this writing, still an additional science lecture facility is being built with a capacity of 350 seats.

At Golden West College, there are at present four facilities with a capacity of more than 90 students. These include the College Center with a capacity of 250 students, Forum 1 with a capacity of 365, Forum 2 with a capacity of 350, and a Health Science Lecture facility with a capacity of 103. Additional facilities are being built at this time at Golden West College too. Suffice it to say, the District is satisfied that large group instruction is a most viable way of conducting college courses.

The facilities described here are quite heavily used. Exhibits I through IV show, for each of the facilities at the two colleges, the capacities, the number of classes scheduled, the number of classes actually held, the number of hours per week of use, and the number of students per week who make use of the facility. The figures shown in these exhibits represent the use of these facilities during the Spring Semester, 1970-71.

A wide variety of different courses are taught in large groups ranging from Introduction to Business to Biology, Chemistry, Psychology, Health

Golden West College - Day

Forum 1

Capacity 365
12 classes scheduled
11 classes actually held
38 hours per week (6 hours arranged)
1,931 students per week

Forum 2

Capacity 350
14 classes scheduled
13 classes actually held
36 hours per week
2,165 students per week

Health Science 117

Capacity 103
7 classes scheduled
6 classes actually held
74 hours per week (nursing program combined classes meet at same time)
293 students per week

Exhibit I

Golden West College - Evening

College Center

Capacity 250
1 class per week
5 hours per week
37 students per week

Forum 1

Capacity 365
4 classes per week
13 hours per week
922 students per week

Forum 2

Capacity 350
3 classes per week
8 hours per week
440 students per week

Health Science 117

Capacity 103
4 classes scheduled
3 classes actually held
10.5 hours per week
241 students per week

Exhibit II

Orange Coast College - Day

Library

Capacity 183
3 classes per week
8 hours per week
53 students per week

Forum

Capacity 300
25 classes scheduled
15 classes actually held
44 hours per week (9 hours arranged)
3,939 students per week

Science Hall

Capacity 375
14 classes per week
38 hours per week (3 hours arranged)
3,685 students per week

Tech 14

Capacity 90
11 classes scheduled
10 classes actually held
30 hours per week
385 students per week

Science 25

Capacity 90
9 classes scheduled
8 classes actually held
26 hours per week
537 students per week

Music 1

Capacity 90
16 classes scheduled
12 classes actually held
34 hours per week (7 hours arranged)
506 students per week

Music 2

Capacity 90
8 classes per week
24 hours per week
179 students per week

Exhibit III

Orange Coast College - Evening

Forum

Capacity 300
3 classes per week
9 hours per week
671 students per week

Science Hall

Capacity 375
4 classes per week
11.5 hours per week
1,249 students per week

Tech 14

Capacity 90
4 classes per week
12 hours per week
385 student per week

Science 25

Capacity 90
4 classes per week
12 hours per week
401 students per week

Music 1

Capacity 90
4 classes per week
12 hours per week
280 students per week

Music 2

Capacity 90
8 classes scheduled
7 classes actually held
19 hours per week
156 students per week

Exhibit IV

Education, Sociology, and, of course, History, the grandfather of them all. Whereas the initial effort at teaching in large groups made use of large lecture sessions and one seminar per week, courses now are arranged in a variety of different ways. Some courses meet for one hour of lecture per week and two hours of small group seminars; or one hour of lecture per week, one hour of small group seminar, and one or two hours of laboratory work. Still others meet for one or two hours of lecture per week and students are assigned to independent study activities for additional time. Such activities would include making use of auto-tutorial learning systems, video tape, and audio tape, computer assisted learning terminals, and other devices.

Although one might question whether or not large group instruction as an instructional system qualifies as an administrative program inspiring innovative activity on the part of faculty members, it is clear that despite its basic characteristic as an instructional system itself, it nevertheless stimulates considerable innovative activity. Considered as an administrative program in terms of class scheduling and faculty assignment, it calls upon faculty members assigned to large group instruction to expend considerable effort at making their large group presentations more effective. To this end, the District awards double-time credit to those instructors who are assigned large group classes. Thus, for example, history teachers normally expecting three units of instructor load credit for a history class, get six if they conduct large group instruction. The double load is justified in the eyes of the administration because the faculty member will find it necessary to devote considerably more time in preparation and planning for his large group presentation than he would probably expend for 35 to 40 students. This

is so because most faculty members find that when in front of a large group, one cannot afford to make a sloppy presentation. The preparation necessary to do a good job in front of a group of 300 students is much more demanding than it is to do just as good a job in front of a handful.

The sheer burden of numbers of students has caused many faculty members to devise inspirational ways of getting the job done. A humanities instructor at Golden West College, for example, faced with the problem of examining a hundred students every week on their ability to recognize and analyze works of art is now working under the support of a Faculty Fellowship to prepare several hundred photographic slides that students will access through the use of a computer controlled microfiche display unit. Having students view these slides on their own time saves several hours per semester of time spent in the large group that otherwise was devoted to operating a slide projector. The instructor feels that not only do the computer controlled microfiche units do a more effective job for the students, but that he is released for more productive work in the large group and can relate more effectively to students on a one to one basis during those periods of time when they interact with the more automated computer controlled system.

In a similar vein, the logistics problems of giving an examination taken by 300 some-odd students are formidable at best to a faculty member assigned the task of teaching this number. As a result, the Coast Community College District computer facility has devised a test scoring and question data bank system they call ORACLE. Using this system, instructors can select objective test questions from a bank of such questions, have the examination prepared for them by the computer system, administer the examination to the student,

and then the computer system will score the examination, return the results to the instructor complete with an item analysis of the entire examination. Automation of the more clerical, mundane aspect of conducting classes is a virtual necessity of large group instruction is to be maintained.

Team teachins is yet another aspect of making effective use of large group instruction. Psychology 1A courses at Orange Coast College, for example, are all conducted using large group techniques. Students are required to attend lectures twice a week and a small seminar once a week which serves a purpose not only of reviewing lecture materials but also as a vital counseling and guidance activity. The large group sessions are conducted in a team teaching manner with all members of the psychology and counseling division participating in the preparation and delivery of large group presentations. This, then, is the kind of innovative impetus that large group instruction has provided the faculty members of both Orange Coast and Golden West Colleges.

THE OFFICE OF EDUCATIONAL DEVELOPMENT

In the Spring of 1969, the Coast Community College District, then operating under the name of Orange Coast Junior College District, made plans to reorganize the District administrative staff. As part of this effort, a new District organization known as the Office of Educational Development was to be formed. This office was to assume research responsibilities theretofore performed by the Assistant to the Chancellor and responsibilities for preparing proposals for funding from sources external to the District, such as the U. S. Office of Education and the Bureau of Vocational Education of the California Community Colleges. In addition, the new office would serve as a District focal point for innovative developmental efforts.

The formulation of the District Office of Educational Development marks the first concerted effort on the part of the Coast Community College District to implement an administrative program designed to induce specific innovative programs. The large group instruction program discussed earlier used a program designed to induce innovation with respect to the use of a particular type of instructional structure. As such, large group instruction is more closely allied with actual instruction than with administrative structure or organization. The Office of Educational Development, on the other hand, is purely an administrative structure whose sole purpose is to foster developmental activities across all instructional lines.

As conceived, the Office of Educational Development serves as a District resource, providing general support and expertise and in implementing developmental or evaluative projects in instructional programs. The office maintains technical expertise needed to assist faculty members who wish to develop and implement new ideas. In addition, the office serves as the District office of institutional research.

The Office of Educational Development is the District's planning mechanism for the development and the evaluation of educational programs. It functions under the direct supervision of the Vice Chancellor of Educational Development who reports to the Chancellor. The office has specific responsibilities in the following areas: (1) The exploration of new, experimental, and innovative instructional programs; (2) The implementation of institutional and evaluative research; (3) The coordination of computer-assisted instruction development; (4) The coordination of instructional technology at both Orange Coast and Golden West colleges; (5) The development

in-service training programs; and (6) The coordination of cooperative relationships held between the District and other institutions of education in instructionally related areas.

Overall responsibility for the Office of Educational Development lies with the Vice Chancellor of Educational Development who coordinates the various functions of the office and, in general, serves as the District advocate in the field. In this capacity, the Vice Chancellor travels to the U. S. Office of Education and to other national and state organizations as the District representative. The office is organized so that all staff members participate in all areas of activity. Specific duties are assigned, at least nominally, to certain key positions within the office These are discussed below:

Associate Director for Planning and Research

The Associate Director for Planning and Research conducts research projects, assists in maintaining research documentation, coordinates student follow-up studies and surveys, works closely with in-service training programs for the faculty, and serves as a research design specialist with special expertise in computer capabilities of the District.

Associate Director for Planning and Reimbursed Projects

The Associate Director for Planning and Reimbursed Projects assists the college in preparing applications for funding of special projects and for acquiring funds provided under specific legislation for educational equipment, instructional material pilot and developmental programs, and the like. He supervises the planning and implementation process involved in preparation of these proposals and works as a close liaison officer with administrators and

faculty members throughout the District and with the campus business offices as well He maintains a library providing information regarding the wide variety of different funding sources available to the colleges and to individual faculty members.

Consultant in Computer-Assisted Instruction

The Consultant in Computer-Assisted Instruction assists faculty members at both colleges in developing computer-assisted instruction course segments, and by coordinating efforts at both campuses, to make effective use of the District's elaborate computer-assisted instruction computer facility. The consultant is directly involved in conducting APL seminars and courses for faculty in order that they may develop the necessary skills required to use the computer as a tool in instruction.

In addition to these four officers, the office enjoys the services of a System Project Leader whose responsibilities include computer programming and systems design projects for research and instructional systems, and an Account Clerk whose duties include maintaining sets of accounts for all the various programs that come under the auspices of the office. These include the Faculty Fellowship Program, Project FUSE, all projects reimbursed from sources outside the District, in-service training, and a number of short-term and ad hoc programs. Exhibit V shows an organizational chart for the Office of Educational Development.

Probably, one of the most important operational functions of the office is that function of serving as a liaison between the District and outside educational agencies with whom the District does business, and from whom the District often hopes to acquire guidance, cooperation and funds for special projects. The Vice Chancellor for Educational Development spends the majority

of his time in activities related to this coordinating function. He serves as the District representative to the League for Innovation in the Community Colleges, and, as has been mentioned earlier, serves as the District advocate in presenting proposals to the U. S. Office of Education, the California Community Colleges, and the California State Department of Education, as well as to private foundations and other sources of funds.

The Office, through the leadership of the Vice Chancellor for Educational Development, plays an important role for the District in terms of the District leadership in the junior college movement. District membership in the League for Innovation in the Community Colleges, as well as its active participation in a number of professional educational organizations, have brought it to the forefront in the junior college movement.

In addition to its role as the public face of the Coast Community College District in terms of educational development and innovation, the Office of Educational Development has been directly engaged in the execution of a number of developmental projects. One of these is Project Follow-Through, a project supported by the Bureau of Vocational Education of the California Community Colleges. This project, now completing its third year, served the purpose of designing implementing and evaluating an information system to gather and maintain information about students who come to community colleges and leave them. In this sense, the Office of Educational Development has been directly involved in the design and implementation of a student data bank to serve various research purposes, as well as to provide the primary base of information for evaluation of instructional programs.

ORGANIZATION CHART, 1970-71

Office of Educational Development
COAST COMMUNITY COLLEGE DISTRICT

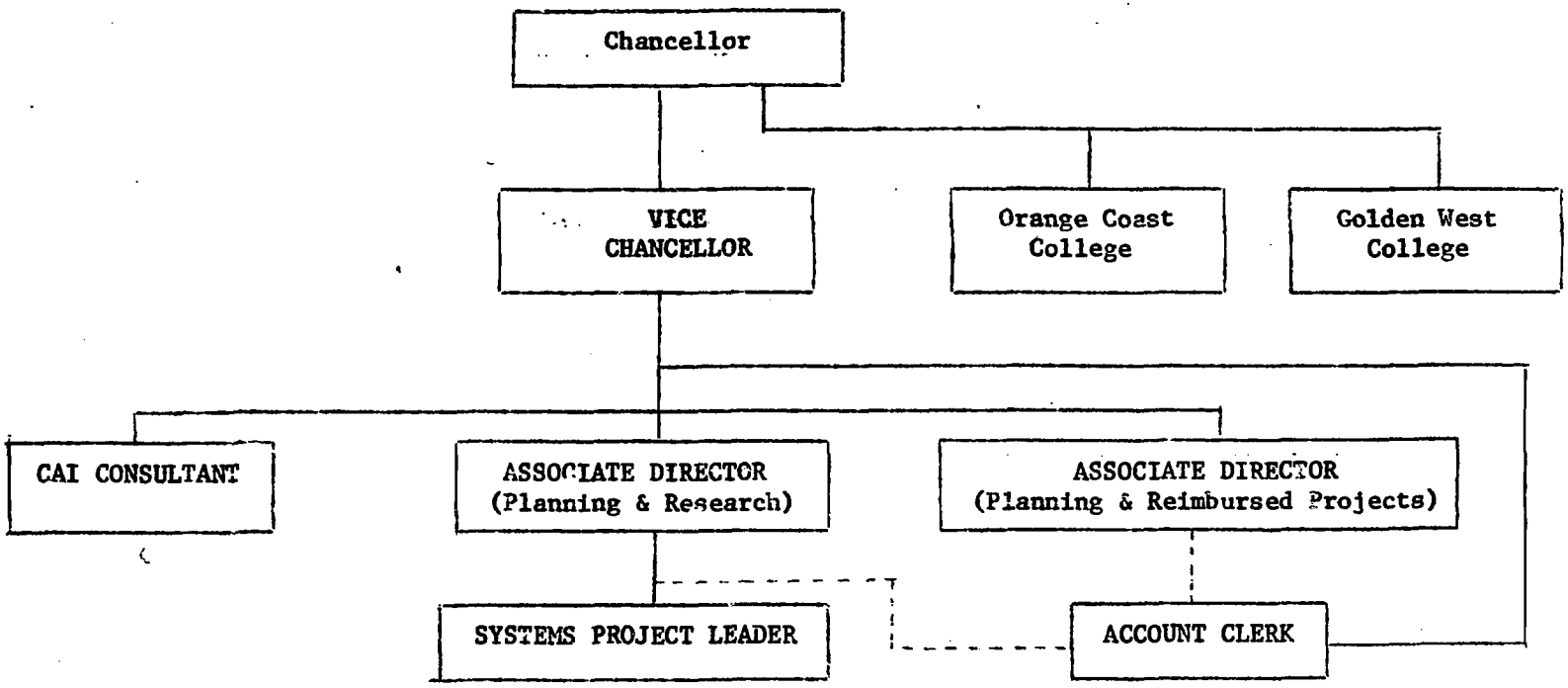

EXHIBIT V

The Office is also directly involved in experimental work in making use of computers for instructional purposes, and, in this regard, has been closely associated with Golden West College in the execution of Project CALCOP, a joint project of Golden West College and the Los Angeles Police Academy designed to prepare computerized simulation for use in law enforcement training. A description of the evaluation procedures of this project may be found later in this paper.

During the Spring Semester 1971, the Office of Educational Development has been conducting an in-service training course for faculty members. This training program prepares faculty members to write computer-assisted instruction programs making use of the APL programming language. Over 70 faculty members from both Orange Coast and Golden West colleges enrolled in this training program. As of this writing, the program is drawing to a close. More than 60 of the faculty members will complete it and each of these has devised specific developmental projects they wish to pursue further in the coming school year. A most important aspect of this training program has to do with rewarding faculty members for attending it. Faculty members receive extension credit from the University of California for completing this course, as well as credit in terms of moving from one salary scale to the next highest on the District salary schedule. Moreover, the District finds that it can receive support from the state for this educational program in the form of average daily attendance income just as it does all other educational programs. In the eyes of the District administration, this is promotion of educational innovation with a vengeance. Not only do faculty members have a carrot for their participation in the in-service training program but the District does too in terms of ADA income.

The Office of Educational Development has been instrumental in conceiving, implementing and operating two important administrative programs. These are the Faculty Fellowship program and Project FUSE. The Faculty Fellowship program along with its close relative, the Summer SAL program, has been hailed by faculty members and administrators alike as the most progressive community college program fostering innovation in the United States. The Project FUSE activity is viewed by the District administration as a most promising and productive source of ideas and direction for the District. Each of these programs will be discussed in detail in the pages that follow.

In its first two years of operation, the Coast Community College District's Office of Educational Development has shown itself to be a viable and productive organization. In terms of innovative programs started, and numbers of faculty members who have now become directly interested in instructional innovation, the Office can only be considered a resounding success.

THE FACULTY FELLOWSHIP PROGRAM

In the Fall of 1969, the Coast Community College District inaugurated the Faculty Fellowship Program. This program solicits and encourages developmental work on the part of the District faculty members toward improving learning experiences in the two District colleges. To this end, the Board of Trustees establishes a fund each year to finance instructional and research projects conducted by faculty members either individually or in groups. These funds may be used to provide supplies, minor equipment, and student assistance to faculty members with projects on which they desired to work. The funds may also be used to provide time necessary for the execution of the project.

Such time may take several forms depending upon the requirements of the specific project. It may, for example, involve time released from the faculty member's regular assignment, it may involve overtime, it may provide a summer job.

In applying for a Faculty Fellowship award, District faculty members define the nature of their project and request support through a Faculty Fellowship using an application form. The application form is a fairly simple document. It asks that the applying faculty member answer seven straight-forward questions. First, what are the objectives of the project? Second, why are the objectives needed? Third, how are the objectives to be met? Fourth, when will the work be done? Fifth, what is the nature of the final project? Sixth, what are the personnel requirements? Seventh, what are the operating expenses? Completed applications are submitted to the President at Golden West College and the Dean of Instruction at Orange Coast College. All applications are reviewed at the college level by a committee of college administrators and faculty members selected for the purpose. Those applications that receive recommendations for approval from these committees are forwarded on to the District office where the District Chancellor, the Vice Chancellor for Educational Development, and the District administrator responsible for administering the Fellowship program make a final review. Upon approval by this group, funds are allocated to projects and work begins as scheduled.

After two years of operation, 127 Fellowships have applied for and 72 have been approved. The total amount of money awarded to faculty members who are to execute Faculty Fellowship programs is $113,333. For the school year

1971-72, the Coast Community College District Board of Trustees have appropriated $70,000 additional dollars.

Of the 72 Facu'ty Fellowships awarded, so far, 16 have been completed in terms of meeting the objectives outlined in the Faculty Fellowship application form. Some comment is appropriate here. Coast Community College District administrators believe that Faculty Fellowships when most successful are never really completed. In point of fact a number of Fellowships now under way are continuations of Faculty Fellowships initially awarded in the school year 1969-70. Fourteen faculty members have been awarded more than one Faculty Fellowship. Almost always these second or third Faculty Fellowship awards are for the purpose of continuing work initially started with their first award.

Exhibit VI shows vital statistics for the Faculty Fellowship program after two years of operation. The upper portion of the exhibit shows the total numbers of Faculty Fellowship applications submitted and the total number of Faculty Fellowships approved and the total number of Faculty Fellowships approved for faculty members who have enjoyed prior Fellowship awards. The lower portion of the exhibit shows the total number of faculty members who have applied for Faculty Fellowships and the total number of faculty members who have been awarded Fellowships. Inasmuch as some Faculty Fellowships involve team efforts on the part of faculty members there are more individual members working on Fellowships than there are total Fellowships that have been awarded.

Faculty Fellowships can be categorized by the type of learning system they focus on. These various types of learning systems include audio-visual

FACULTY FELLOWSHIP PROGRAM

VITAL STATISTICS

	Orange Coast College	Golden West College	Total
FELLOWSHIP PROJECTS			
Total Number of Faculty Fellowships Applied	68	59	127
Total Number of Faculty Fellowships Approved	33	39	72
Total Faculty Fellowships With More Than One Fellowship Approval	6	4	10
FACULTY MEMBERS INVOLVED			
Total Number of Faculty Members Applied	78	68	146
Total Number of Faculty Members Approved	35	45	80
Total Faculty Members With More Than One Fellowship Approval	6	8	14

EXHIBIT VI

FACULTY FELLOWSHIP PROGRAM

Learning Systems	Number of Awards
Audio-Visual Aids	13
Computer Assisted Learning	11
Auto-Tutorial; Multi-Media Systems	17
Audio Tapes	7
Video Tape; Films	8
Syllabi; Scripts	3
Miscellaneous	13

EXHIBIT VII

aids for classroom use; computer assisted learning; auto-tutorial or multi-media systems; audio-tape development; video-tape or film production; syllabi or script production; and a number of miscellaneous projects that really defy categorization. The Faculty Fellowships described in Appendix I are categorized into these broad areas of development. This is not to say however that any one particular Faculty Fellowship can be fitted into a particular category with 100% confidence. Some Faculty Fellowship programs cross these categorical lines and really serve more than one. Exhibit VII summarizes the activities of the Faculty Fellowship program in terms of types of learning systems involved.

Of the various administrative programs described in this paper, the Faculty Fellowship appeals to this writer as the most progressive and most productive of them all. Two or three times each year the Office of Educational Development queries faculty members involved in executing Faculty Fellowships and, in addition, asks them for informal reports as to their reaction in terms of how they view the Fellowship program in general and as to how the Office of Educational Development could improve its administration. Without exception all faculty members responding to these questions indicate their wholehearted enthusiasm for the program. One of the many comments we have received is presented below.

> This memo is to let you know that the Faculty Fellowship programs is one of the most progressive ideas in my opinion which has been instituted in the Orange Coast Junior College District and state for that matter. It has been my opportunity to discuss this project with faculty members in many California Community Colleges this year. Without exception they were all extremely interested and excited about the idea.

It has been my opportunity to have completed a biology audio-tutorial program and two semesters of anatomy/ physiology program. I feel, therefore, that I am in a fairly good position to judge the effectiveness of the Faculty Fellowship program. The program seems to be more professional which is a positive factor. It makes one feel as if he is giving the District something rather than the other way around totally even though it is really both. I guess that is what I mean by the Fellowship program being more professional.

I have had release time to prepare projects. What usually happens of released time basis is that one usually devotes more time to his partial classroom assignments and a good portion of the project ends up by being done on his own time anyway. For myself a project such as this is much better and more effective being done on individual time.

Of the three separate projects that I have done this gave me greater satisfaction than any other. I had all the necessary materials, equipment, and lab assistants which were required. Whether by design or otherwise, the project has been a most satisfactory experience and I thank you and the District. (Norman E. Rich, writing to the Office of Educational Development, July 14, 1970.)

THE SUMMER SAL PROGRAM AT GOLDEN WEST COLLEGE

In 1968, Golden West College inaugurated a program by which faculty members work during the Summer on particular developmental projects. The total amount of funds spent by the Coast Community College District for the Summer SAL Program so far is $38,147.13. Of this $11,190.00 was spent for projects executed during the Summer of 1968, $17,337.00 for the Summer of 1969 and $19,619.63 for the Summer of 1970.

Under the SAL Program, faculty members at Golden West College wishing to work on developmental projects submit descriptions of their projects to the college President. The President and other members of his administrative

staff review the proposals and select those which will be supported. Like the Faculty Fellowship program, projects executed under this program are supported in terms of supplies, lab assistants, and payment to faculty members who work six weeks during the summer at a rate equivalent to one half of the established per diem rate.

Generally, the SAL program is less formalized than is the Faculty Fellowship program. Because of this, faculty members find budgetary procedures somewhat more flexible. Funds for lab assistants to assist faculty members in their projects are sometimes drawn directly from the SAL budget or, frequently, lab assistant funds are provided from out-of-District sources, such as the Economic Opportunities Program. The same thing is true of supplies funds. As faculty members work on their SAL projects, supplies and materials needed are provided by Golden West College, and the source of money for these materials is drawn about equally from the Project SAL budget and from the regularly established supplies and materials budgets for the college. These monies, however, are typically not great. The total amount of money spent for the 1970 SAL program in terms of supplies expenditures was $2,435. Lab assistant expenditures similarly have not been great under the SAL program. During the Summer of 1970, a total of $3,584.63 was spent for lab assistants under the SAL program. Of this amount, only $1,744.39 came directly from funds appropriated for SAL. The remainder came from other Golden West College budgets and from funds provided from budgets established for lab assistants by the Multi-Media Center, the Learning Resources Center, and the Economic Opportunities Act. Exhibit VIII shows the vital statistics for the Summer SAL program.

GOLDEN WEST COLLEGE

Summer SAL Program
Vital Statistics

	SUMMER			TOTAL
	1968	1969	1970	Total
Number of SAL Projects	12	12	15	39
Number of faculty members involved	14	19	19	52
Funds Disbursed	$11,190	$17,337.50	$19,619.63	

Learning Systems	Number of Projects
Audio-Visual Aids	12
Computer Assisted Learning	8
Auto-Tutorial; Multi-Media Systems	14
Audio tape	2
Video tape; films	3
Syllabi; scripts	1

EXHIBIT VIII

By and large, one could observe that faculty members tend to bite off more than they can chew as they begin these projects. Of those twelve projects initiated during the Summer of 1969, eleven faculty members made specific mention in their progress reports that they were unable to complete the project or that additional work is necessary. This is not to say that the picture is at all unsatisfactory. In fact, during the Summer of 1970, many of the projects identified as incomplete or needing additional work after the previous Summer's work were completed. Moreover, an examination of expenditures for supplies and laboratory assistants for the school year 1970-71 showed that $369.93 was spent for lab assistants used to complete work on SAL projects started during the Summer of 1970. Thus, although the SAL program is considerably primarily as a Summer effort, it is apparent that work continues throughout the school year.

The Summer SAL program is viewed with great enthusiasm on the part of the Golden West College staff. As one faculty member puts it

> I would like to extend my appreciation to the District for making the project possible. I believe the farsighted attitude on behalf of the District in funding projects, such as SAL and Faculty Fellowships, will assure quality education for the students, and keep our District at the forefront of innovation. I appreciate working for a District that encourages the development of this type of education. (Ronald Gibson, writing to the Golden West College Administration.)

In comparing the Summer SAL program with the Faculty Fellowship program, it is apparent that the Faculty Fellowship program involves greater numbers of individual faculty members, as well as greater numbers of individual projects. This, of course, is at greater expense. Whether or not the District enjoys more production per dollar from the SAL program as opposed to

the Faculty Fellowship program is a matter of conjecture. Moreover, it is probably irrelevant. As reported by administrators and faculty members at both colleges, and in the District offices as well, both the SAL program and the Faculty Fellowship program have shown the District faculty to exhibit a particular characteristic that tends to reduce cost deficiency questions with respect to developmental expenditures to the level of triviality. Faculty members, although agreeing to work, say, six weeks during the Summer to do a project, in fact work considerably longer than that. As a result, the District, putting up funds for a particular amount of expected effort on the part of faculty, in fact, gets several times that amount of effort, and, moreover, finds the faculty member doing the work waxing more and more enthusiastic about getting it done. It also finds him inspiring his colleagues, heretofore not involved in developmental work perhaps, to consider projects of their own. The process can be likened to throwing matches from an airplane down to a hill of dry chaparral. Each match ignites one bush, and each bush in turn, sets its neighbors afire. This seems to be the case with both of these programs. Individual faculty members, once ignited, tend to ignite their surrounding colleagues.

PROJECT FUSE (FACILITIES, UTILIZATION, AND STAFF EFFECTIVENESS)

Late in the Fall of 1969, the Chancellor of the Coast Community College District brought an assignment to the Office of Educational Development. The Office was to propose means by which the District could improve instructional effectiveness and utilization of physical facilities. The Office of Educational Development was asked by the Chancellor to formulate one or more

specific action plans, specifically focused upon new instructional programs and techniques, that would increase the overall effectiveness of the District's instructional activities. The Chancellor made it clear that he wanted an idea with the same instructional potential as large group instruction.

After several weeks of deliberation, the Office of Educational Development prepared a document that had this to say:

> The rapidly growing population in the Coast Community College District places heavy demands on resources of the District in all areas of instruction.
>
> The Office of Educational Development proposes that a task force be chartered to identify, describe, and implement strategies that will assist the District in more effectively using its resources. The activities of the task force will be known as Project FUSE (Facility, Utilization, and Staff Effectiveness). These activities will culminate, it is anticipated, with one or more specific plans to be implemented during the School Year 1970-71. For the purpose of improving the cost-effectiveness of the employment of the District staff and physical facilities, all avenues of resource utilization will be explored.
>
> Project FUSE will serve several objectives: (1) Establish a means of effectively tapping expertise in the District in order to more effectively utilize resources. (2) Provide a participatory creative mechanism for identifying and implementing strategies to make the District's instructional program more economically effective. (3) Identify for implementation during the School Year 1970-71 one or more specific plans to improve the cost-effectiveness of the District employment, the staff and physical facilities. (Statement prepared by the Office of Educational Development, December 1969, as paraphrased by the writer.)

The plan to accomplish this consisted of establishing a Project FUSE Task Force, consisting of two administrators from the Office of Educational Development, the Deans of Instruction of both Golden West and Orange Coast Colleges, three representatives each from the faculty of both colleges chosen

by the faculty senates of the colleges, one representative from Golden West College President's Cabinet, and one representative from Orange Coast College's Administrative Cabinet. This group repaired to the California Teachers Association Conference Facility at Monte Corona, California for a four-day retreat, spanning February 15 through February 18, 1970. The purpose of the retreat was to surface unique ideas and to contrive means to implement them during the school year 1970-71. The agenda of the retreat included an initial banquet on the 15th of February, at which the District Chancellor delivered a short address outlining his hopes and aspirations for the Task Force; two days of brainstorming sessions, the purpose of which would be to identify specific ideas and action plans; and one day to critique the action plans and to develop initial implementation methodologies and recommendations for future action. After returning to their colleges, members of the FUSE Task Force would work individually and as members of the subgroups of the Task Force to revise and polish the plans developed after retreat.

In support of this project, the District provided a total budget of over $13,000 consisting of those funds necessary to pay for the Monte Corona retreat; salary expenses to cover faculty work during the Spring vacation and the Summer, as well as for additional time spent during the school year; some funds for travel; and a small budget for supplies and expenses.

In formulating plans for the FUSE project, use of the term "Cost Effectiveness" was found to be unfortunate. Faculty members and many administrators viewed this term as threatening and as evidence of the District's determination to reduce operating expenses at the cost of quality of education, if necessary. No little effort was spent by the Office of Educational

Development in counteracting this wave of negative interpretation, and after the initial statement of purpose, quoted above, the use of that term was discontinued. Once this important sematic problem was resolved, the faculty senates at each of the two District colleges selected their FUSE Task Force representatives and plans were made to take the group to the Monte Corona Conference Facility.

At the retreat, the FUSE Task Force identified over sixty specific projects or areas of interest that the District could investigate in terms of improving the effectiveness of its instructional program. From this sixty, twelve specific action programs were identified. These programs were discussed and refined at the retreat and a document was prepared, outlining for each of the action programs what was to be done, how it was to be done, who was to do it, and when it was going to take place. In addition, those members of the FUSE Task Force specifically responsible for a particular action program were identified. All of this information was delivered to the Board of Trustees on February 25, 1970. The Vice Chancellor for Educational Development had this to say in a memorandum covering the delivery of the action plans to the Board of Trustees:

> Evidence of the enthusiasm can be seen in the fact that the session at Monte Corona turned out to be a marathon. The team met together each morning for breakfast at 7:00 a.m. and began discussions. At 8:00 a.m., work officially began. The team remained together during breaks, at lunch, through dinner, and back again until 11:00 or 12:00 p.m. each evening. This steady work did not result from the planned agenda but from the desire of each to keep working because the projects were so important. The resulting enthusiasm has now taken the form of 12 proposals on which team members and others are continuing work.

The twelve members of the FUSE Task Force returned from the retreat at Monte Corona filled with an enthusiasm and inspiration not unlike the

religious fevor found in a revival tent. The group made two presentations, one each at faculty meetings at both Golden West and Orange Coast colleges. At these meetings, the various action plans identified at the retreat were outlined for the faculty.

The faculty meetings marked the last concerted effort of the FUSE Task Force as a complete body. Thereafter, various members of the Task Force pursued the various action programs identified at the retreat with varying degrees of vigor. During the Easter vacation of the Spring Semester, nine members of the 12-member Task Force group devoted most of the week to discussing and refining two of the action programs, and towards the end of the school year, an evening meeting was held at which ten members were present. In addition, some members of the FUSE group have met with the college presidents on three occasions during the past school year to ascertain where the group stood and where it was going in the future.

As of this writing, the status of each of the 12 action plans, identified by the FUSE Task Force at the Monte Corona retreat, are as described in Appendix III. By and large, the FUSE program has not been as productive in tangible educational artifacts as those directly involved hoped it would be at the end of the Monte Corona retreat. To be sure, some progress has been made in terms of implementing some of the ideas found in the twelve action programs. The District is moving ahead with television, for example, and has established tutorial centers and embryonic programs taking the college to the community. Most observers in the District agree, however, that these things did not come about because of the FUSE effort directly, as they were bound to come about anyway. The best FUSE did, so goes this opinion, was to speed their arrival somewhat.

In the view of this writer, lack of adequate time on the part of the FUSE Task Force members and lack of formalized organizational structure of the Task Force group hampered the group's effort at actually doing the work proposed. Most District administrators, however, view the FUSE program as a successful one. The FUSE Task Force, as planning and brainstorming group, serves a most useful function in the eyes of the Chancellor and of the Chancellor and of the Vice Chancellor of Educational Development. The group will continue to operate as an advisory and as a planning group in the School Year 1971-72. Plans for its operation during that year were discussed at a meeting of the FUSE Task Force held on May 3, 1971. Membership in the FUSE Task Force will be changed so that other faculty members will have an opportunity to participate in this deliberative body.

ONLY PART OF THE PICTURE

The five administrative programs presented here do not tell the whole story of innovative efforts at the District, of course. This writer would be remiss indeed if he paid no heed to the great variety of individual efforts which, although generally unheralded, do much to foster change. In addition, the Media Resource Centers at Golden West and Orange Coast Colleges, although not administrative programs in the same sense as are the Faculty Fellowship Program or Project FUSE, nevertheless do at least as much as any one such program in inducing faculty members to try something new. Moreover, in providing technical resources, both mechanical and human, the Centers make it all possible. Without them, innovation at the District would remain mostly talk.

COMPARISONS OF DIRECT INSTRUCTIONAL COSTS

In reviewing the literature dealing with calculation of instructional costs available today, this writer alluded several times to the lack of adequate cost systems that assign costs as they are incurred to specific educational programs. Lacking such a cost accounting system, it is virtually impossible to arrive at any meaningful costs for any kind of educational program or educational system. This section of this paper blunders ahead, nevertheless, and tries. through the use of certain inductive processes, to arrive at rough estimates of the costs of different kinds of instructional methods developed by the District. These methods include auto-tutorial systems, as used in biology and remedial English, large group instruction for psychology and cultural anthropology.

In the intuitive analysis presented here, the use of the term "direct instructional costs" will be found with some frequency. This term is used to refer to those costs that can be directly associated with the implementation of the learning system under consideration. An accountant would probably call these costs incremental or variable costs, inasmuch as if the particular earning system were to be discontinued those costs would disappear. This is not always true. To the extent possible, the analysis here amortizes certain expenditures for capital equipment over periods of time, and, even should the particular instructional program be discontinued, these costs would remain.

Probably the biggest shortcoming that the reader should be aware of as he begins examining these examples is the lack of allocating costs of physical facilities to each of the programs discussed. Intuitively, one would

suspect that it's outright cheaper to teach psychology in large groups of 300 or more than it is to teach the same number of students in groups of 40. This would be so because one large room is cheaper to build than many smaller rooms, each one equipped with redundant equipment and providing redundant instruction.

Some efforts, of course, have been devoted to allocating costs to specific instructional programs (Heinkle and Wattenburger). Nevertheless, we have a long way to go before any kind of costs analysis will really be meaningful. The best this paper can do at this point is to illustrate the kind of thinking that might be employed by school administrators in making rough evaluations of the comparative costs of some new instructional strategy as opposed to some other way of going about the same job. All of the comparisons here, for example, assume that instructional effectiveness is at least as good in the new system as it was in the old. This is not necessarily a good assumption, but it's most difficult to find a faculty member who has developed a new way of teaching something who does not also say that this new way is the best thing for teaching since the teacher himself.

Admonishing the reader to keep these shortcomings firmly in mind as he reviews the following paragraphs, we turn now to a few programs at the Coast Community College District for which costs have been estimated and compared.

COSTS OF BIOLOGY 2 AT GOLDEN WEST COLLEGE

At Golden West College, Biology 2 is a survey course emphasizing basic concepts of plant, animal and human ecology; population evoluation; and genetics. This course is specifically designed for non-science majors and is recommended to meet the general education breadth requirements of the

college. The course is taught making use of an auto-tutorial laboratory and involves two hours of lecture per week in which students assemble as large groups and three hours of laboratory per week during which time students make use of one auto-tutorial laboratory facility. The difference between this instruction and conventional instruction in biology lies in the auto-tutorial laboratory. Under conventional methods, students would gather in groups of thirty or so for two hours of laboratory per week. Under the auto-tutorial system, employed at Golden West College, students use the laboratory for a total of three hours per week at their convenience. The laboratory is always open and students may make use of it from 8:00 in the morning until 10:00 at night.

Auto-Tutorial Laboratory

Exhibit IX shows the procedures used to calculate the hourly direct costs of instruction for the Biology 2 course making use of the auto-tutorial laboratory. Direct instructional salaries were calculated using classified and certificated salaries for the year 1970-71. These figures are not available for all learning systems to be discussed in this paper but they were available for this particular program and they are listed accordingly. The evaluation of those programs for which specific figures are not available will make use of the average salary for a certificated teacher in the District. Equipment costs were determined through the expedient of persuing purchase orders over the period of time from Fall 1969 through Spring 1970-71. Total equipment expenditures over this 18-month period is divided by six to reflect the notion that this equipment would be expected to last for approximately three years and should be amortized at approximately one sixth of its value

DIRECT COSTS OF INSTRUCTION

Golden West College Biology Auto-Tutorial Laboratory

(1 Semester)

Direct Instructional Salaries		
1 paraprofessional (Bringle), 5 months at $687	$ 3,345	
1 certificated (Pederson), 1/2 x $10,250	5,125	
4/5 certificated (Stanley), 1/2 x $15,811 x 4/5	6,325	
4/5 certificated (Green), 1/2 x $12,989 x 4/5	5,196	
Evening certificated $9.00 per hour, 5 hours/week	810	$ 20,801
Equipment, $36,212 ÷ 6		6,035
Supplies, $9,821 ÷ 3		3,274
IMC Charges, $1,480 ÷ 3		493
Total Direct Cost Per Semester		$ 30,603

Number Biology 2 Students (Day & Evening)

	Any Grade	A,B,C, D, or Cr.	4th week Enrollment
Fall Semester 1969-70	377	332	502
Spring Semester 1969-70	323	298	433
Fall Semester 1970-71	365	352	574
	1,065	982	1,509
Average one semester	355	327	503
Hours of Instruction (5 hrs/week, 18 weeks)	31,950	29,430	45,270
Hourly Cost of Instruction	$ 0.96	$ 1.04	$ 0.68

Exhibit IX

each semester. Supplies expenditures over a three-semester period amounted to $9,821. Charges from the Instructional Material Center at the college for the three-semester period of time were similarly treated. Each of these figures was divided by three to derive an average supply expenditure per semester for the course. Exhibit IX also shows the number of day and evening college students completing Biology 2. The total number of students completing the past few semesters of Biology 2 with any grade at all, including F, were 1,065. Those students completing that course with the grades A, B, C, D, or Credit, were 982. The total number of students enrolled in the course as of the fourth week of the semester was 1,509. The average number of students enrolled in and completing Biology 2 in any one semester was calculated by dividing these figures each by three. Hours of instruction for the Biology Auto-tutorial Laboratory was calculated by multiplying the average number of students completing in one semester by the number of hours per week each student was required to attend the laboratory or the biology lecture sessions. Hourly costs of instruction was then calculated by dividing the total cost by the average hours of instruction per semester. The resulting hourly costs of instruction are shown on the bottom line of the Exhibit.

Conventional Instruction

Exhibit X shows the estimated costs of conducting instruction in biology using conventional instructional techniques. The conventional system, considered in this case, is one in which students study biology in groups of 30 and spend five hours per week in a laboratory type facility of which three hours are spent in lecture and two in actual laboratory work. The costs

shown in this Exhibit were determined from information gained by interviewing Dr. William Stanley, Chairman of the Math-Science Division at Golden West College, the man chiefly responsible for the development and current operation of the Biology Auto-tutorial Laboratory conducted at that college. . Stanley, in turn, interviewed biology teachers at El Camino College and drew upon his many years experience of teaching in the field to provide these costs.

Direct instructional salaries of conducting conventional instruction in biology were calculated by assuming 503 students enrolled in biology for a semester, (these average 4th week enrollment for the last three semesters) and dividing that number by 30 to arrive at 17 sections that would have to be offered during the semester period of time. At Golden West College conducting a biology course that met three hours per week per lecture and two for lab, would amount to four fifteenths of a full-time teaching load for one semester. The average annual salary at the Coast Community College District is $13,948 or $6,974 per semester. Multiplying 17 sections times 4/15 then times the average semester salary for the District, yields a total instructional salary for the 17 sections of $31,615. Dr. Stanley estimated that it would cost about $19,000 for each of the laboratory-type facilities used for conventional teaching of biology. Moreover, if scheduling of biology lecture and laboratory sessions was done in an optimum manner, all 17 sections could be handled with two facilities although Dr. Stanley admitted the scheduling job would be very difficult, and many students would be unhappy with their scheduled hours of instruction. Assuming the equipment in these laboratories to last the same length of time as the equipment in auto-tutorial laboratories, that is about three years, the $38,000

investment for equipping the two laboratories would bring the equipment costs per semester to about $6,333. Dr. Stanley estimated supplies costs for students in conventional instruction at about $6.00 per student per semester. At 503 students, this amounted to a total of $3,018. The total direct costs per semester of conducting instruction for biology using conventional instruction techniques amount to $41,506. Dividing these costs by the number of hours of instruction yields the hourly costs of instruction shown at the bottom of the Exhibit.

A number of comments about this process are in order here. First, the inductive logic in arriving at hourly costs of instruction for conventional instruction in biology followed the same pattern as was used in determining the direct costs of instruction for biology instruction using the auto-tutorial laboratory. Of some interest to this writer is the close relationship between equipment costs per semester and supplies costs per semester for the two learning systems. Setting aside, for the moment, whether or not the per student equipment and supplies costs for conventional instruction is, in fact, very close to their counterpart costs for auto-tutorial instruction, the difference in direct instructional salaries between the two systems accounts for the important differences we find in hourly costs of instruction as between the two instructional systems. In point of fact, however, there is some reason to think that equipment and supplies costs per student would be lower in auto-tutorial instruction in biology than they would be for conventional instruction. Evaluating the degree to which these costs would be lower, however, is a very difficult task, as many intangible factors come into play. As Dr. Stanley pointed out during his interview, with an auto-tutorial system, cost savings can be enjoyed through the central-

DIRECT COSTS OF INSTRUCTION

Conventional Instruction for Biology

(503 Students for One Semester)

Direct Instructional Salaries		
Certificated (17 sections x 4/15 x 6.974)	$ 31,615	
Laboratory assistants (15 hours per week each lab, 18 weeks @ $2.00)	540	$ 32,155
Equipment For Two Full Labs (@ 19,000 = 38,000 ÷ 6)		6,333
Supplies & Handouts (@ $6.00 per student)		3,018
Total Direct Cost per student		$ 41,506

Number of Biology Students

	Any Grade	A,B,C, D, or Cr.	4th Week Enrollment
Average, one semester	355 (71%)	327 (65%)	503 (100%)
Hours of Instruction (5 hrs/week, 18 weeks)	31,950	29,430	45,270
Hourly Cost of Instruction	$ 1.20	$ 1.41	$ 0.92

Exhibit X

ization of facilities and the sharing of laboratory facilities, equipment and supplies by a number of different courses. Thus, the laboratory used by Biology 2 students utilizes equipment that is also used throughout the Science Division. Under conventional instruction, the degree to which this sharing of equipment and supplies could take place is severly limited, particularly in the tight scheduling characterizing the system analyzed in Exhibit X. Stanley offered some specific examples. A cost of four hundred dollars each was required for a refrigerator and an incubator to serve the auto-tutorial laboratory and all of the 503 students that made use of it. This cost would be doubled if two separate laboratories with 30 stations each were employed instead. Compound microscopes are another example. The auto-tutorial laboratory makes use of one of these whereas the conventional laboratories would require 30 each or at least one set of 30 to be shared by the two laboratories, but, of course, that would involve additional scheduling problems. Small apparatus setups at student stations typically run about $6.00 per year per station to set up. For 30 stations, of course, this amounts to $360. Auto-tutorial laboratories only use one station and all students pass by it.

Other even less tangible benefits of the auto-tutorial laboratory are similarly important, reported Dr. Stanley. The centralized supply arrangement makes for economies of scale in terms of purchasing expendable supplies. One does not purchase small quantities to place in a number of different laboratories but rather enjoys the ability to buy in bulk. Instructional personnel seem more satisfied with the auto-tutorial arrangement and one would suspect that their time is better utilized. Instructors do not spend hours conducting a laboratory for 10 or 15 students out of an initial enroll-

ment of 30 as they would in conventional instruction. Under the auto-tutorial method, if the laboratory is essentially empty, the instructor can devot his time to other things. In addition to better utilization of time, the teachers seem happier, and one would expect a higher retention rate and a higher morale within the division. Certain fixed charges probably would reduce under the auto-tutorial instruction system says Stanley. Insurance premiums, for example, probably are lower under the auto-tutorial laboratory than they would be if Golden West were to use two or three laboratories, each with a full complement of equipment. The total amount of equipment available is lower and would require lower insurance premiums to cover it.

The costs of conventional instruction, discussed so far, are all based on the average number of students who were enrolled in Biology 2 in the auto-tutorial laboratory for the last three semesters. This number is 503. The auto-tutorial laboratory can handle more students than that. Dr. Stanley estimates that up to 1,000 students could use the auto-tutorial laboratory without substantial increase in total operating expenses per student. Exhibit XI shows the estimated direct costs of instruction for conducting conventional biology instruction for a fourth-week enrollment of 1,000 students. Thirty four sections of biology would be required to handle a thousand students, bringing direct certificated instructional salaries up to $63,231. The number of laboratory facilities required increases from two to four for a total equipment costs per semester of about $12,666. Laboratory assistant costs double, as do the costs of supplies and handouts per student. The total cost of instruction of $82,977 for instructing a thousand students in biology in this conventional method yield hourly costs of instruc-

DIRECT COSTS OF INSTRUCTION

Conventional Instruction In Biology

(1,000 Students for One Semester)

Direct Instructional Salaries		
Certificated (34 sections x 4/15 x 6,974)	$ 63,231	
Laboratory assistants (15 hours per each lab, 18 weeks @ $2.00)	1,080	$ 64,311
Equipment For Four Fall Labs (@ 19,000 = 76,000 ÷ 6)		12,666
Supplies and Handouts (@ $6.00 per student)		6,000
Total Direct Costs of Instruction		$ 82,977

Number of Biology Students

	Any Grade	A,B,C, D, or Cr.	4th Week Enrollment
Based on 1,000 students, 4th week	710 (71%)	650 (65%)	1,000 (100%)
Hours of Instruction (5 hrs/week, 18 weeks)	63,900	59,500	90,000
Hourly Cost of Instruction	$ 1.30	$ 1.39	$ 0.92

Exhibit XI

tion of $1.30, $1.39, and $0.92, depending upon how one wants to count students. This represents a negligible change as compared to 503 students in a conventional manner but remains a substantial increase over the hourly costs of instruction in conducting biology instruction using the auto-tutorial laboratory. Whether or not the hourly costs of instruction for conducting biology instruction in the auto-tutorial laboratory would increase per student over the figure shown in Exhibit IX is somewhat open to question. There is reason to believe that, as currently manned, the auto-tutorial laboratory is sufficient to handle a thousand students with only small increases in supplies expenses resulting from the increased student load.

Exhibit XII summarizes the cost comparisons present here regarding Biology 2 instruction.

COSTS OF PSYCHOLOGY 1A AT ORANGE COAST COLLEGE

Psychology 1A at Orange Coast College is taught as an introduction to psychology. It is required of all students for graduation and the college recommends that students take it during the first semester of their enrollment. In addition to academic study of basic psychology, students are afforded counseling and guidance as part of their Psychology 1A experience. As currently taught, the course is organized in such a way that students attend lectures two hours per week in large groups and meet with a small seminar of 15 to 20 students for one hour per week. Large group lectures concentrate on academic matters of psychology and the small group seminar emphasizes career guidance and student counseling.

According to the division chairman for counseling and guidance and the department chairman for psychology, no other course in the United States has had more attention than Psychology 1A at Orange Coast College, in terms of

SUMMARY OF DIRECT COST COMPARISONS

Biology 2

	A-T Lab	Conventional 503 Students	Conventional 1000 Students
DIRECT COSTS			
Direct Instructional Salaries	$ 20,801	$ 32,155	$ 64,311
Equipment	6,031	6,333	12,666
Supplies	3,274	3,018	6,000
IMC Charges	493	-0-	-0-
Total Direct Costs	$ 30,603	$ 41,506	$ 82,977
AVERAGE NUMBER OF STUDENTS			
Any Grade	355	355	710
A,B,C,D, or Cr.	327	327	650
4th Week Enrollment	503	503	1,000
HOURLY COST OF INSTRUCTION			
Any Grade	$ 0.96	$ 1.03	$ 1.30
A,B,C,D, or Cr.	1.04	1.41	1.39
4th Week Enrollment	0.68	0.92	0.92

Exhibit XII

course content, design, and organizational structure, and in terms of both student participation and faculty assignment. A total of 11 full-time equivalent instructors are involved in teaching Psychology 1A at the college. Three of these instructors devote themselves exculsively to conducting large group lectures. To this end, these three instructors meet two hours per week for coordination purposes and devote considerable time to evaluation of the entire course proceedings. In addition, the equivalent of eight full-time instructors conduct the seminars. The structure of the seminars is such that every student attending a seminar finds that the instructor of the seminar is his personal counselor. In this way, a student is brought into close contact with his instructor once a week for his entire first semester of attending the college.

Exhibit XIII shows a compilation of available costs for conducting large group instruction in psychology at Orange Coast College. These costs are not complete. They consist only of direct instructional salaries. Direct instructional salaries are estimated using the average figure for certificated salaries in the Coast Community College District of 13,948. Eleven full-time equivalent instructors at one semester each yields a total certificated cost of $76,714. In addition, two para-professional course assistants are employed to help the instructors in the conduct of large group instruction in psychology. These course assistants each earn $687, and at four and one-half months each, total cost per semester is $6,183. Total direct costs for large group instruction, in terms of direct instructional salaries, is $82,897. A comparable figure for conventional instruction can be derived by determining the number of sections required to serve the 2,339 students enrolled in psychology on the average during the fourth week for the

DIRECT COSTS OF INSTRUCTION

Psychology 1A

	Large Group	Conventional
Direct Instructional Salaries		
Certificated (11 full-time instructors @ 13,948 ÷ 2)	$ 76,714	-
(60 sections x 3/15 x 6,974)	-	$ 83,688
Para-professional course assistants (two for 4 1/2 mos. each @ $687)	6,183	-
Total Direct Salary Costs	$ 82,897	$ 83,688
Average Number of Psychology 1A Students, Fall Semester		
Any Grade	1,894	1,894
A,B,C,D, or Cr. Grade	1,612	1,612
4th Week Enrollment	2,339	2,339
Hourly Costs of Instruction		
Any Grade	$ 1.46	$ 1.47
A,B,C,D, or Cr. Grade	1.71	1.73
4th Week Enrollment	1.08	1.09

Exhibit XIII

past two fall semesters. At about 40 students per section, this yields a required number of sections of 60. Inasmuch as one such section would consist of three fifteenth of a full-time certificated faculty member's teaching load, one multiplies 60 sections times three fifteenths times $6,974, the average salary for a faculty member for one semester in the District. This calculation yields a direct instructional salary cost of $83,688.

Interviews with teachers involved in large group instruction in psychology indicates that the amount of supplies and materials required of large group instruction is no more, necessarily, than it would be for conventional, and there seems to be no significant area in which large scale savings can be ascribed to large group instruction over conventional instruction. Some coordination of film rentals and other one-time costs is possible but it is doubtful if this amounts to very much on a per student basis.

As Exhibit XIII shows, the hourly costs of instruction between large group and conventional teaching techniques does not really differ much and, in fact, large group instruction seems to cost just a little bit more of instruction.

This writer reminds the reader that these estimates are characterized by a total disregard of the physical facilities needed to conduct the instruction. The number of individual rooms necessary to schedule 60 sections of psychology might suggest a number of rooms more expensive to build and maintain than would a large facility seating over 300 students. It is doubtful, of course, that either the smaller facilities or the large room would be used exclusively for psychology instruction, and, because of this fact alone, if not for several other reasons in addition, it is almost impossible to ascribe the particular costs of a physical facility to any one area of instruction.

There are exceptions, of course, that go beyond the scope of the present discussion. These involve vocational education and technical programs, but, by and large, the type of instructional facilities used by Psychology 1A are indistinguishable from the kinds of facilities used in many other kinds of instruction. As a result, we would expect any such facilities, large or small, to be shared by many different programs.

Justification for large group instruction for psychology at Orange Coast College, then, cannot look to decreased cost per student in terms of direct instructional salaries but instead must look to more effective instruction. Evaluation of this process, as was observed earlier, is a continuing thing. Instructors and counselors as well as administrative officials at Orange Coast College all agree that Psychology 1A instruction is better today in the present form than it has been in the past. The instructional staff circulates from time to time student evaluation forms to help measure the degree to which the program is satisfying student needs. The results of the latest of these exercises is reported in a later section of this papaer.

COSTS OF ENGLISH A AT GOLDEN WEST COLLEGE

Auto-Tutorial Laboratory

English A at Golden West College teaches basic concepts in the use of English. Students enrolling in this course attend one hour of large group instruction once a week and four hours of independent study sessions in an audio-tutorial laboratory, the materials for which were prepared under the Summer SAL and Faculty Fellowship Programs. In the independent study sessions, students study assigned materials, making use of individual study carrels, confer with instructors, or with teaching assistants with respect to ques-

tions concerning the material they are studying, and check a bulletin board maintained in the laboratory for information regarding class activities, test scores, and quiz study guides. In addition, one half hour a week is spent in a small assembly session consisting of from 40 to 50 students.

Determination of the costs of conducting English A instruction making use of the auto-tutorial laboratory system follows the same pattern as that used in determining the costs of conducting Biology 2 instruction presented earlier in this paper. Exhibit XIV shows the costs per hour of instruction for the nine week English A course. Direct instructional salaries include payment to one para-professional at $722 per month for nine weeks. Two certificated persons are involved, the first of which is the chairman of the Communications Department, three fifths of whose time is devoted to operating the English auto-tutorial laboratory. For the nine-week period then, this person's salary is allocated as three fifths times one fourth times the faculty member's salary. One other certificated faculty member is involved in operation of the laboratory. This consumes two fifths of that person's teaching assignment for the year. Laboratory assistants work 270 hours for each nine-week session. The auto-tutorial laboratory makes use of just over $69,000 worth of equipment. Estimating that that equipment would last three years, its cost is amortized at the rate of one twelfth for each nine-week session. Supplies used for the laboratory total $1,658 for the last three semesters. Dividing this figure by six yields an average supplies cost per each nine-week session. Charges from the Instructional Material Center at Golden West College for the last three semesters total $1,058. Treating these in the same manner as supplies shows a total Instructional Material Center charge for each nine-week session at $176. Total direct costs per nine-week session

DIRECT COSTS OF INSTRUCTION

Golden West College English A Auto-Tutorial Laboratory

(First 9 Weeks of Fall Semester)

Direct Instructional Salaries		
1 para-professional (Follin) (2 1/2 months @ $722)	$ 1,805	
3/5 certificated (Freligh) (3/5 x 1/4 x 16,725)	2,509	
2/5 certificated (Hunter) (2/5 x 1/4 x 14,981)	1,498	
Laboratory assistants (270 hours @ $2.00)	540	$ 6,352
Equipment, $69,237 ÷ 12		5,769
Supplies, $1,658 ÷ 6		276
IMC charges, $1,058 ÷ 6		176
Total Direct Cost Per 9-Week Sessions		$ 12,573

Total Number Students	Any Grade	A,B,C, D, or Cr.	4th Week Enrollment
1st 9 weeks, Fall 1969-70	529	298	637
1st 9 weeks, Fall 1970-71	565	381	880
Average, 1st 9 weeks of Fall semester	547	339	758
Hours of Instruction (5 1/2 hrs/week, 9 weeks)	27,076	16,780	37,521
Hourly Cost of Instruction	$ 0.46	$ 0.75	$ 0.34

Exhibit XIV

of operating the English auto-tutorial laboratory is $12,573

The lion's share of students enrolling in English A enrolled during the first nine-week session of the Fall semester. The average number of students enrolled at this period of time for the last two school years is 547 students receiving any grade at all, 339 students receiving A, B, C, D, or Credit grade, and 758 students enrolled in the class as of the fourth week of the nine-week session. At five and one half hours per week of instruction for nine weeks, these numbers of students then received a total of 27,076 hours, 16,780 hours, or 37,521 hours, depending upon how one wants to count students. Hourly costs of instruction are determined by dividing the total hours of instruction into the total cost of operating a lab for the nine-week session. These figures are shown at the bottom of Exhibit XIV.

Conventional Instruction

Exhibit XV shows the estimated costs of conducting English A instruction for 758 students, the average number enrolled in the first nine-week session of the last two Fall semesters. The number of 30-student sections needed to handle this enrollment is 26. Inasmuch as English A instruction is the equivalent of one-tenth of a full-time faculty member's annual teaching assignment, the total direct instructional salaries for conducting this instruction amounts to $36,265. At $3.00 per student, supplies and handouts add up to $2,274 yielding a total direct cost per semester of $38,539. Hourly costs of instruction are shown at the bottom of the Exhibit.

Miss Freligh, Chairman of the Division, estimates that the auto-tutorial lab for English A instruction can handle up to 1500 students through the expedient of increasing the number of lab assistants. Exhibit XVI shows the

DIRECT COSTS OF INSTRUCTION

English A Conventional Instruction

(758 Students for Nine-Weeks)

Direct Instructional Salaries	
Certificated (26 sections x 1/10 x 13,948)	$ 36,265
Supplies and Handouts (@ $3.00 per student)	2,274
Total Direct Costs per Semester	$ 38,539

Number of English A Students

	Any Grade	A,B,C. D, or Cr.	4th Week Enrollment
Average, 1st 9 weeks of Fall semester	547 (72%)	339 (45%)	758 (100%)
Hours of Instruction (5 1/2 hrs/week, 9 weeks)	27,076	16,780	37,521
Hourly Cost of Instruction	$ 1.39	$ 2.30	$ 1.03

Exhibit XV

hourly costs of conventional instruction for English A if 1500 students were enrolled. Providing the number of lab assistant hours required, in order for the auto-tutorial laboratory to handle 1500 students would add approximately $3,240 to the total costs of operating it. About $1,000 in additional supplies for the total program per semester would also be required. This adds approximately ten cents to the hourly cost of instruction for those students who complete the course with an A, B, C, D, or Credit grade and about seven cents per hour for those students who enroll in the course during the fourth week. The resulting costs of $0.83 and $0.40 respectively, are far less than the comparable costs of $2.22 and $1.00 for conventional instruction. Exhibit XVII summarizes the cost comparisons for English A instruction.

CULTURAL ANTHROPOLOGY AT ORANGE COAST COLLEGE

At Orange Coast College, Cultural Anthropology is taught using large group instructional methods. Students enrolled in Cultural Anthropology attend one large lecture group of 300 students, conducted in the Forum, for two hours each week. In addition, every student attends a seminar, consisting of 25 students, one hour per week. The entire course is operated by one faculty member whose sole assignment for the semester is conducting it. In addition, he is helped by a course assistant who serves four other courses in addition to Cultural Anthropology. This course assistant takes attendance, records grades, and distributes printed materials in class. Data processing facilities at Orange Coast College are used to process multiple choice tests and the instructor is expected to produce more visual materials and other manifestations of preparation for large group instruction than is expected from instructors conducting conventional instruction.

DIRECT COSTS OF INSTRUCTION

English A Conventional Instruction

(1,500 Students for Nine Weeks)

Direct Instructional Salaries	
Certificated (50 sections x 1/10 x 13,948)	$ 69,740
Supplies and Handouts (@ $3.00 per student)	4,500
Total Direct Costs per Semester	$ 74,240

Number of English A Students

	Any Grade	A,B,C, D, or Cr.	4th Week Enrollment
Based on 1,500 students, 4th week	1,080 (72%)	675 (45%)	1,500 (100%)
Hours of Instruction (5 1/2 hrs/week, 9 weeks)	53,460	33,412	74,250
Hourly Costs of Instruction	$ 1.39	$ 2.22	$ 1.00

Exhibit XVI

DIRECT COSTS OF INSTRUCTION

English A Auto-Tutorial Laboratory

(First 9 weeks of Fall Semester)

Direct Instructional Costs	A-T Lab	Conventional 758 Students	Conventional 1,500 Students
Direct Instructional Salaries	$ 6,002	$ 36,265	$ 69,740
Equipment	5,769	-0-	-0-
Supplies	352	2,274	4,500
Total Direct Costs	$ 12,223	$ 38,539	$ 74,240
Average Number of Students			
Any Grade	547	547	1,080
A,B,C,D, or Cr.	339	339	675
4th Week Enrollment	758	758	1,500
Hourly Direct Costs of Instruction			
Any Grade	$ 0.45	$ 1.39	$ 1.39
A,B,C,D, or Cr.	0.73	2.30	2.22
4th Week Enrollment	0.33	1.03	1.00

Exhibit XVII

Exhibit XVIII shows the relative costs of conducting Cultural Anthropology instruction with large groups as opposed to conventional groups. Certificated salary involved in large group instruction is equivalent to one half of a faculty member's annual salary. In addition, one fifth of a paraprofessional salary, at $687 a month, and supplies, at approximately $6.00 per student, are included. This yields a total direct instructional cost for large group instruction of $9,240. The average numbers of students completing Cultural Anthropology for the past three semesters are 241 receiving any grade, 236 receiving the grade A, B, C, D, of Credit, and 294 students who were enrolled as of the fourth week enrollment. At three hours per week for 18 weeks, the number of hours of instruction is calculated accordingly and is shown in the Exhibit. The hourly cost of instruction is calculated by dividing the number of hours of instruction into total direct instructional costs. These figures are shown at the bottom of Exhibit XVIII.

If Cultural Anthropology were taught using conventional methods, the number of sections required to serve an average fourth week enrollment of 294 students would be eight. As Cultural Anthropology, as taught in conventional means, serves as three fifteenths of a full-time faculty member's teaching assignment for one semester, one multiplies eight sections times three fifteenths times one half of the average instructor's salary of $6,974. This yields a certificated salary cost for conventional instruction of $11,158. Estimating $3.00 per student of supplies and visual aids, used in conventional instruction, and adding this figure in total direct costs of instruction for Anthropology, and using conventional instructional means, is $12,042, which yields hourly costs of instruction of 92 cents, 95 cents and 76 cents per hour, depending upon how one wants to count students.

Large group instruction for Cultural Anthropology at Orange Coast seems to be less expensive per hour of instruction than does large group instruction in psychology. In this case, although perhaps not in psychology, one can claim that large group instruction affords some cost savings per hour of instruction. Dr. Dwayne Merry, instructor of Cultural Anthropology at Orange Coast College, told this writer during an interview that the released time he was provided as part of his teaching assignment to prepare materials for large group instruction was really inadequate for what he wanted to do and that he needed more stimulating teaching devices. Moreover, Dr. Merry felt that he lost contact with students in the Forum and suggested using graduate students in the seminars, thus releasing the faculty member for more individual consultations with students. Should this be done, of course, the increased cost of para-professional help would more than eliminate the costs savings resulting from large group instruction under the present system.

DIRECT COSTS OF INSTRUCTION

Cultural Anthropology at Orange Coast College

	Large Group	Conventional 294 Students
Direct Instructional Costs		
Certificated salaries		
(13,948 ÷ 2)	$ 6,974	-0-
(8 sections @ 3/15 X 6,974	-0-	$ 11,158
1/5 para-professional		
(4 1/2 mos. @ $687)	502	-0-
Supplies and Visual Aids		
($6.00 per student)	1,764	-0-
($3.00 per student)	-0-	884
Total Direct Instructional Costs	$ 9,240	$ 12,042
Average Number of Students		
Any Grade	241	241
A,B,C,D, or Cr.	236	236
4th Week Enrollment	294	294
Hours of Instruction (3hrs/week, 18 weeks)		
Any Grade	13,014	13,014
A,B,C,D, or Cr.	12,744	12,744
4th Week Enrollment	15,876	15,876
Hourly Cost of Instruction		
Any Grade	$ 0.71	$ 0.92
A,B,C,D, or Cr.	0.72	0.95
4th Week Enrollment	0.62	9.76

Exhibit XVIII

COMPARISONS OF INSTRUCTIONAL EFFECTIVENESS

If comparing relative costs of different instructional programs and systems is difficult, comparing the effectiveness of these systems is even more so. These pages present examples of evaluative efforts exercised by the Coast Community College District in the past several months. The first of these deals with remedial English procedures and compares the effectiveness of instruction in English 1A Freshman Composition in terms of grades earned by students and in terms of attrition rates. This is an example of normative evaluation based upon grades assigned students by instructors.

The next two comparisons serve as examples of evaluating different instructional systems in terms of meeting objectives as measured by an examination. This kind of comparison avoids problems of subjective evaluation characterizing normative comparisons and replaces them with equally difficult problems of test validity.

Finally, a number of informal evaluation efforts are reported. These deal primarily with solicitations of student opinion with respect to the

effectiveness of a learning system. If community colleges serve the primary purpose of meeting student needs, this type of evaluative technique is the only one that really makes sense, assuming that students have accurate perceptions of their educational needs.

REMEDIAL ENGLISH PROCEDURES: BEFORE AND AFTER

Starting with the Fall Semester 1968-69, remedial English at Orange Coast College was taught to students requiring it as an integral part of their experience in English 1A, Freshman Composition. This procedure represented a change over previous years during which students needing remedial work in grammar, syntax and other matters first completed a remedial English course before enrolling in English 1A.

The Office of Educational Development gathered data for the purpose of determining, if possible, the extent to which student performance in English 1A as measured by grades and attrition rates changed substantially after the inauguration of the new policy regarding remedial work in English. Exhibit XIX shows grade assignments for all students enrolled in English 1A during this four-year period. The column headed "Before" shows grades earned by students during the four semesters spanning the Fall of 1966 and the Spring of 1968. The "After" column shows grades earned by students during the four semesters starting with the Fall of 1968 and ending with the Spring of 1970. The terms "Before" and "After" at the head of these columns indicate that the right-most grade distribution reflects grades earned after the new procedures were inaugurated. The other column indicates grades earned before their inauguration.

GRADE DISTRIBUTION FOR ENGLISH 1A

	Before	After
Grade Point Average	2.49	2.67
Percentage Completing Course	63.2	65.1
Percentage Completing Course Successfully	57.4	62.5
Number receiving A	397	627
Number receiving B	1,022	1,493
Number receiving C	1,022	1,128
Number receiving D	200	126
Number receiving F	46	7
Number receiving Cr	0	0
Number receiving NCr	0	19
Number receiving I	48	123
Number receiving W	1,481	1,664
Number receiving WF	33	6
Total Enrollment	4,249	5,193

EXHIBIT XIX

Grade point averages for the English 1A course increased slightly as between the "Before" and "After" groups. Statistical number-pushing showed that this increase is significant at the .01 level of confidence (Ferguson, pages 155, 167-168). This means that the difference in grade point averages between the "Before" group of students and the "After" group of students probably did not come about by sheer chance. The percentage of students completing the course with a grade of A, B, C, D, F or Credit increased from 63.2 for students taking English 1A during the years 1966 through 1968 to 65.1 for those enrolling in English 1A from 1968 through 1970. Application of statistical procedures shows that this increase probably did not come about by chance either, that is to say, that the increase is significant statistically at the .01 level of confidence.

The percentage of students completing the course successfully, that is, completing it with either an A, B or C grade rose from 57.4 percent for the "Before" group to 62.5 percent for the "After" group. This increase of 5.1 percentage points is also statistically significant at the .01 level of confidence.

This is not to say, however, that the increase of grade point average or of percentage of students completing the course is necessarily an important increase or that it necessarily vindicates the changes in procedure. It does say that for some reason a few more students completed the course in English 1A in the "After" group than completed the same course in the "Before" group and that students completing the course earned slightly higher grades. Whether or not this reason is directly related to the changes in remedial instruction procedures cannot be determined from these numbers.

COMPUTER ASSISTED LEARNING TO TEACH COMPUTER OPERATIONS

During the Spring Semester, 1969-70, two Orange Coast College instructors designed and implemented a number of computer assisted instruction (CAI) segments for use in the computer operations course offered at their college. This work was done under the auspices of a Faculty Fellowship. Among other things, the segments included routines specifically devoted to the teaching of IBM System/360 Disk Operating System computer operator commands.

The procedures followed in this project consisted if six steps. Each of these is briefly described in the paragraphs that follow.

Design CAI Segments

The objectives of the operator command portion of the computer operations course included the following:

a. Students should be able to recognize correct Disk Operator System (DOS) operator commands in relation to specified computer functions to be performed. Achievement of this objective is measured by multiple choice examination questions.

b. Students should be able to identify computer system functions that take place as a result of executing specified operator commands as measured by multiple choice examination questions.

c. Students should be able to distinguish between correct and incorrect operator commands and operator procedures as measured by true-false examination questions.

d. Students should be able to provide the correct computer operator commands needed to cause specified computer functions to be performed as measured by fill-in examination questions.

e. Students should be able to describe specific steps to be taken by a computer operator to cause the computer system to perform specified computer functions as measured by essay examination questions.

f. Students should be able to define certain terms used in computer operations as measured by essay examination questions.

g. Students should be able to describe and provide examples of the operation of specific operator commands as measured by essay examination questions.

Computer assisted learning segments simulating the disk operating system of the IBM System/360 Model 50 Computer and offering tutorial material teaching operator commands were designed to offer students the opportunity to control a complex computer software system without requiring the dedicated use of the computer system. Altogether, these computer assisted learning segments replace approximately five hours of lecture materials dealing with DOS operator commands.

Test the CAI Segments

The computer assisted instruction segments were tested in two ways. First, they were used by students in the computer operations course offered during the Spring Semester, 1969-70. Second, they were examined and used by ten data processing instructors attending the Summer Institute in Data Processing conducted by Orange Coast College during the months of July and August, 1970. This Institute was attended by experienced data processing instructors who came for the purpose of studying advanced topics in modern computer system programming and operation.

The students using the materials during the Spring Semester found them to be a most enjoyable way to learn computer operations. It was thus established that students undergoing training in the subject matter, using computer assisted instruction materials, would not react unfavorably to the materials by virtue of their intrinsic nature. The data processing teachers similarly found the CAI segments most promising and became quite excited about their use.

This testing program and the resulting changes made to the CAI segments assured us that the learning materials that had been developed were acceptable

on the part of both data processing teachers and data processing students and deserved further examination to determine their relative effectiveness in achieving specific objectives of the computer operations course.

Establish Control and Experimental Groups

The population of this study consists of 28 students who completed the computer operations course offered at Orange Coast College during the Fall Semester, 1970-71. At the start of the course, these students were divided into a control group (15 members) and an experimental group (13 members). The control group received conventional classroom instruction in matters dealing with computer operation. This instruction consisted of classroom lectures and demonstrations. The experimental group studied computer operation through the use of computer assisted instruction segments.

The students were divided into control and experimental groups on the basis of two factors. First, each student was asked to fill out a short questionnaire designed to determine the degree of experience he might have in data processing prior to enrolling in the course. The questionnaire also determined what other data processing courses the student had completed. Each member of the computer operations class also took the SCAT II examination.

The members of the class were then divided into two groups, A Group and B Group, based upon previous training and experience as determined from the class questionnaire. The mean SCAT II scores of these two groups were then compared to determine whether or not there was a statistically significant difference in measured ability between the groups. Exhibit XX shows the composition of the two groups and the SCAT II scores for each member of the class. Homoscedasticity for the two groups with respect to SCAT II scores was verified by finding the ratio between their variances and using it to consult a table

of the F distribution. No statistically significant (.05 level of confidence) difference between the variances was found. The W. S. Gosset formula was used to calculate t (Ferguson, pages 155, 167-168). This yielded a t score of 0.29 which was not significant at the .05 level. This indicated that there was no significant difference between the two groups with respect to SCAT II scores. Thus, the control group and the experimental group were judged to be about equal, both in terms of ability as measured by the SCAT II score and in terms of previous training and experience as determined through the use of the class questionnaire.

Conduct Training

Instruction was given to the control group following conventional classroom procedures including lecture and classroom discussion and demonstrations. The experimental group did not receive lecture or classroom discussion in the area of computer operations but limited their training experiences in this area to the computer assisted instruction segments. The control group participated in two classroom sessions of three hours each during which the conventional instruction was offered. The experimental group spent at least this much time proceeding through the CAI segments and were told that they could spend as much time as they liked using these materials. Both the experimental and the control group members could approach the instructor and ask questions on an individual basis.

In addition to classroom instruction and computer assisted instruction, students participated in the execution of laboratory exercises in which they actually operated the computer system. Each student did this as a member of a team. The class was divided into four teams, two teams from the experimental group and two teams from the control group. Each team was given a number of

laboratory exercises and made use of the computer facilities to execute the exercise. Each laboratory exercise required 45 minutes for execution.

Administer Examination

After the training was completed, all students in the class took an examination testing for the achievement of the objectives of this portion of the course. The examination consisted of 43 multiple choice questions, 20 true-false questions, 10 fill-in questions, four essay questions, and required students to describe the specific computer operations of 13 operator commands commonly used by computer operators.

Compare the Examination Scores of the Control and Experimental Groups

Exhibit XXI shows the examination scores for students in both Group A and Group B. Examination scores were tested for homogeniety of variance as described earlier with respect to SCAT II scores. This examination showed that there is no statistically significant difference (.05 level of confidence) between the variances in examination scores for the two groups. Application of the Gossett t test yielded a t score of 0.12. This score reveals no significant difference between mean examination scores of students in Groups A and B at the .05 level of confidence.

Results

Objective analysis following the procedures described above show no significant difference in performance between that group of students who studied operator commands through the use of CAI segments as compared with those who studied it using only conventional classroom instruction techniques.

Subjectively, however, two observations were made by the instructor. First, that portion of the computer assisted learning materials in which the

operation of a computer console was simulated by an APL terminal was not as enthusiastically received by the students as was the tutorial computer assisted learning materials presented through the APL terminals. The instructor explained this phenomenon by reasoning that an APL terminal simulating a console typewriter terminal offers nothing more in terms of learning experiences than does the console typewriter itself. Students may as well go directly to the computer console and try to learn to operate it by relying entirely upon operator's manuals and other manufacturer's applications. The tutorial materials, on the other hand, offered learning experiences that analyzed students' errors and guided them through various learning processes. This was received much more warmly on the part of students than were the simulation exercises and the instructor believes that, for this subject matter at least, the tutorial method of computer assisted learning is by far the best.

The instructor also observed that the experimental group seemed considerably more confident and were better organized in the laboratory exercises than were members of the control group. Teams 1 and 2, the teams from the control group, had considerable difficulty executing the laboratory exercises with the computer system. One of them did not complete them within the allowed time at all. Teams 3 and 4, however, both drawn from the experimental group, completed the exercises within the allotted 45 minutes and Team 3 completed it in only 15 minutes. Although not all of this difference in performance can be directly attributed to the computer assisted instruction exercises, one would like to think that improved performance at the computer itself is more important than the lack of score differences on a written examination. The laboratory performance difference is not merely a result of the experimental group working with computer machinery and the control group not. In point of

fact, both the experimental and the control group worked extensively with the computer throughout the course. The only additional computer exposure enjoyed by the experimental group over the control group had to do with the completion of the computer assisted learning segments themselves. This additional exposure cannot alone result in the different performance levels observed in the computer room.

Conclusions

This small study re-enforced in many ways what educators have learned about other similar studies regarding the relative effectiveness of different instructional techniques (Dubin and Taveggia). By and large, such studies all demonstrate that, at least judged by teacher evaluation in the form of course grades and examination scores, any one instructional technique is neither better nor worse than any other. This too, apparently, is true for computer assisted instruction with respect to teaching computer operator commands. In short, the objective results of this study, namely that there is no significant difference in test scores between the control and experimental groups, does not tell us anything we did not expect to find out. However, the subjective results that students seem more enthusiastic and seem to perform better in the real world environment of the computer room, seemed more encouraging.

Of course, one may argue that the increased enthusiasm on the part of students as well as on the part of the data processing instructors exposed to the CAI segments is merely the result of novelty. This may be so. However, it renders the differences in computer room performance nonetheless important. If the use of novel instructional techniques will do a better job of teaching, then surely we must use them. It remains to be seen whether or not the novel aspects, if that is what they are, of computer assisted instruction will soon

wear off. If they do, then we must look beyond novelty and try to judge the merit of this new instructional technique on its intrinsic worth.

COMPUTER ASSISTED INSTRUCTION FOR LAW ENFORCEMENT

The analysis described here was performed as part of Project CALCOP, an experimental project conducted jointly by Golden West College and the Los Angeles Police Academy. It was financed under a grant from the Law Enforcement Assistance Administration under the Omnibus Crime Bill.

Project CALCOP served a two-fold purpose. First, the project sought to develop a computer assisted learning system for the purpose of training in the area of search and seizure. Second, the project evaluated the effectiveness of the computer assisted learning system. In doing this, the project examined the hypothesis that the learning system designed by the project, consisting in independent study and CAI exercises, would be more effective than conventional classroom instruction.

Procedures followed in Project CALCOP are enumerated below:

1. Objectives of training programs in search and seizure and rules of evidence were formulated.

2. An examination designed to test the degree to which the objectives were met was developed and validated.

3. A syllabus of cognant material to be used for study purposes on an independent basis was prepared.

4. Case problems simulated through the use of the computer terminal were prepared and implemented.

5. Training was conducted using the computer assisted learning system and the syllabus at Golden West College. Training also took place through conventional classroom instruction at the Los Angeles Police Academy.

6. The examination was administered to police cadets at both the Los Angeles Police Academy and the Golden West Academy. Performance on this examination was compared between the two

groups to determine if the computer assisted instruction techniques were more or less effective than conventional classroom techniques.

Evaluation of the learning procedures designed as part of Project CALCOP followed conventional statistical procedure. The project was interested in the null hypothesis that there would be no significant difference in performance levels between cadets at the Golden West Police Academy (the experimental group) and cadets at the Los Angeles Police Academy (the control group) as measured by a common examination. Finding a statistically significant difference would give cause to reject the null hypothesis, concluding that the CAI learning procedures were either more or less effective than the conventional procedures, depending upon the sign of the difference.

Comparison of performance scores between the control and experimental groups with respect to the CALCOP examination enactments as well as on the California Short Form Test of Mental Maturity and the Wonderlic Personnel Test made use of the t test for significant differences in mean scores and the Wilcoxon matched pairs signed-rank test (Ferguson, pages 167-174).

Examination Preparation

Inasmuch as the purpose of the evaluative phase of Project CALCOP was to measure the relative effectiveness of the computer assisted instruction techniques with conventional classroom presentation techniques, a first important task of the project was to develop the final examination. An initial examination was developed by instructors of the Golden West College Law Enforcement Program. The examination was tested at the Los Angeles Police Academy. Groups of cadets at the Academy would take the examination. After scoring, the cadets and the instructor would critique the examination in terms of clarity and legal accuracy. After making appropriate modifications, the

instructor would administer the examination to a fresh group of cadets and repeat the evaluation. In this manner, cadet reactions to and performance on the examination was carefully considered in subsequent revisions of the final examination. Revisions were retested as described above until the final draft of the examination was completed.

Control and Experimental Group Selection

The experimental group for this study consisted initially of twenty-seven police cadets enrolled in the Golden West College Police Academy during the Fall semester, 1970-71. This group undertook to study matters of search and seizure through independent use of the syllabus and through the use of the computer assisted instruction simulation exercises described earlier in this report.

The control group for the experiment consisted of police cadets at the Los Angeles Police Academy who undertook to study matters of search and seizure through conventional classroom instruction as conducted at that Academy. Sixty police cadets out of a class of seventy-one at the Los Angeles Academy took the final examination enactments.

Members of both the control and the experimental groups took the California Short Form Test of Mental Maturity and the Wonderlic Personnel Test. Using the IQ scores achieved on the California Short Form Test of Mental Maturity as a basis, twenty-seven members of the Los Angeles Police Academy group were selected so as to give twenty-sevem matching pairs of cadets, one group each from the Golden West College Police Academy and from the Los Angeles Police Academy.

The District employed a number of tests and comparisons making use of Wonderlic and IQ scores. As a result of these calculations and

comparisons, it made the following observations:

1. There is no significant difference in mean IQ scores as measured by the California Short Form Test of Mental Maturity between the twenty-three member experimental group at Golden West College and the twenty-three member control group at the Los Angeles Police Academy.

2. There is no significant difference in mean Wonderlic Personnel Test scores between the control group and the experimental group.

3. The control group of Los Angeles Police Academy cadets is a representative sample in terms of IQ and Wonderlic scores of the total seventy-one member group of Los Angeles Police Academy cadets.

4. There is no significant difference in either mean IQ scores or in mean Wonderlic scores between the Golden West College experimental group and the total group of Los Angeles Police Academy cadets.

Accordingly, any differences to be found between performance levels on the examination enactments as between Group 1 and Group 2 could not be attributed to differences in ability as measured by the California Short Form Test of Mental Maturity and the Wonderlic Personnel Test. Differences in performance levels on the final examination must be accounted for by other factors.

Training

Police cadets at the Los Angeles Police Academy studied materials relating to proper procedures in search and seizure matters under conventional classroom instruction. This instruction consisted of lectures and classroom discussions. Police cadets at the Golden West College Police Academy studied the same materials making use of the study syllabus and the computer assisted simulated case problems. This group received no classroom instruction.

Examining

After completing the training program in search and seizure, cadets at both the Police Academy in Los Angeles and the Academy at Golden West College completed a written examination consisting of case problems or enactments in which the student was asked specific questions about procedures and matters of fact relating to the situation described.

Results

Both the t-test and the Wilcoxon matched pairs signed-rank tests were applied to the performance scores on the examination enactment. In every case, cadets at the Golden West Police Academy performed better on the final examination than did cadets at the Los Angeles Police Academy and in every case the difference in performance levels was statistically significant at the .05 level of confidence.

Conclusions

The most obvious conclusion to be drawn from the procedures outlined above says that the learning procedures followed at Golden West College in the area of search and seizure were more effective than were the procedures followed at the Los Angeles Police Academy, at least as measured by the final examination. The District has this to say in their final report on Project CALCOP.

> We assert, and our conclusions here are based upon the statistics reported above, that this basic difference in instructional approach accounts for the differences we find in performance levels between the Los Angeles Police Academy control group and the Golden West College Academy experimental group. (Project CALCOP Final Report, p. 23)

Following this assertion, the final report considers a number of other factors that might account for the performance differences between the

control and experimental groups. These factors included experimental bias (the so-called Hawthorne effect), examination procedures and previous experience of police cadets. (Project CALCOP Final Report, pp. 23-27). Dispatching these as matters not affecting cadet performance through the use of statistical analysis, the investigators summarized:

> Although we are not prepared on the basis of Project CALCOP to conclude that the computer assisted learning portion of the learning system devised is more effective than classroom instruction, we do think that the total learning system including independent study of the syllabus as well as computer assisted case problems, presents a more effective learning environment in the area of search and seizure than does conventional classroom instruction. This is not to say, of course, that conventional classroom instruction has been other than excellent in quality. In fact we cannot say, as a result of this study, that it has been good, bad, or indifferent. Rather, we have found evidence that instructional effectiveness in search and seizure can be further improved through the use of learning systems similar to that developed by Project CALCOP. (Project CALCOP Final Report, pp. 27-28).

INFORMAL EVALUATION

Most instructional evaluation at the Coast Community College District takes place on an informal basis and draws heavily on student reaction to the total instructional program. Student reaction is often solicited through the use of end-of-the course questionnaires administered to students by faculty members. Quite often, even more casual observation serves as the basis of evaluating the effectiveness of the particular type of instruction.

This portion of the paper presents some verbatim comments delivered to the Office of Educational Development by faculty members who were engaged in evaluating instructional systems prepared under the auspices of the Faculty Fellowship Program. The first of these reports the degree to which students made some use of sound-on-slide materials developed as a supplementary learning system for large group instruction in Psychology 1A. The report

identifies a couple of problems in conducting large group instruction and then presents the sound-on-slide system as an effort to solve some of these problems. The second report, and the more rigorous of the three, presents the findings of a fairly extensive survey of students making use of the Math-Tutorial Center at Golden West College. In addition to soliciting student views on it, some effort was expended toward a normative evaluation of actual student performance. The third report, making only casual reference to student performance, devotes itself mostly to evaluating the mechanical devices used in the project and to clapping the Office of Educational Development and other District workers on the back for their help in executing the project.

Sound-On Slides (Dean Burchett)

This project was to develop "100 sound-on-slide conceptual units to be used by the division in it's instructional activities." It was understood that this objective was so designed as to allow a high degree of flexibility as needs become evident during the development of the project.

Procedures - After purchasing the necessary supplies and equipment, discussing and demonstrating the hardware capabilities with members of the staff and beginning a unit on the history of Psychology; some considerations that were to guide the rest of the project emerged. In effect they were as follows:

1. Certain students in Introductory Psychology find the large-group situation both frustrating and difficult. Often the core of the dissatisfaction stems from the perceived difficulty of the evaluation instruments used in the class. Through a great deal of

effort had been made to standardize test feedback, this aspect of the instructional program left much to be desired.

2. Unfortunately, the large-group situation often seemed most disconcerting to the highly motivated student and to the student who was slightly below average in learning ability. It was felt that both these groups of students could profit from some form of individualized access to test feedback.

In a conversation with Roy Andreen, (Dean, Counseling and Guidance) he suggested the possiblity of using the sound-on-slide equipment for test feedback. This set the wheels in motion for what appears to be a very effective innovation in a Psychology program.

During the Spring Semester of 1970, each question used in the large-group was typed on an 8 1/2" X 11" sheet of plain paper with the primary typewriter. A 35mm slide was made of them and they were placed in the sound-on-slide machine. The teacher who had submitted each question then prepared a 35 second audio explanation explaining the principle, concept of objective of the question, the correct answer, why that was the correct answer, and where the answer could be found (in the lecture or text page). After each 50-question examination these units were made available in the multi-media center of the library on a voluntary basis to students.

It is significant that the final examination in this course is comprehensive and consists of 100 questions. Fifty of these questions reflect the principles already tested for during the semester. The assumption is that a motivated student can go over the 150 questions in the machine just prior to the final and have reviewed for him approximately one-half of the final.

We demonstrated this equipment to the students in the large-group

immediately after the first examination and instructed them regarding its availability.

Findings - We received considerable positive feedback from both students and seminar teachers. The most significant consideration seems to me to be the number of students who availed themselves of the equipment. According to the console operator, 371 requests were logged for the machine. In view of the fact that there were usually several students watching it at once--on occasion as many as ten--it becomes evident that the students did perceive it as an effective adjunct to their study.

Conclusions - We are involved right now in preparing the test questions for our first fifty question examination. It is a time consuming, at times laborious task but it appears that the staff considers it worthwhile. I suspect that we have, with a very moderate investment, offset some of the disadvantages of the large-group class. Hopefully, that student who doesn't learn too rapidly, and the one who is willing to spend extra time to do better; now has at his disposal a structured review wi h some answer as well as some reasons why, pertinent to the objectives of the course.

Someday, when time permits, I would still like to put together a few units on some topics in Psychology. The slides on a unit in the History of Psychology are already finished. This, however, will have to wait because we do feel that existing use of our time, and that of the machine, is being used most effectively in the present application.

Math Tutorial Center (Maurice Smith and William Stanley)

As the result of funding through a Faculty Fellowship, the Golden West Math Council was able to offer a mathematics tutorial service during the Spring Semester of 1970. This service was available to students seeking

individual assistance in mathematics.

The purpose of this paper is to describe the tutorial services provided, to report on the data collected regarding the services, and to offer an evaluation and recommendations which may be useful for the operation of future mathematics tutorial services.

Description of the Services -

Purpose: A Mathematics Tutorial Center was established at Golden West to provide individual assistance to students having difficulty in mathematics.

Facilities: A room in the College Center was reserved for the tutoring services. The room was equipped with tables, chairs and a portable blackborad.

Hours: The services began on February 11 and continued until the beginning of final examination (June 4) and was available on a daily basis between the hours of 8 a.m. and 2 p. m.

Staff: Members of the mathematics faculty and nine advanced math students served as tutors for the Center with from one to three tutors assigned each hour in the Center. The student tutors hired were recomme ded by the math faculty. Each math instructor donated two hours a week in the Center while the student tutors spent a total of 40 hours a week in the Center, making the total tutor time 52 hours.

The Math/Science Division Counselor acted as Director of the Tutorial Center and a student lab assistant was hired to assist with the clerical work.

Research and Data Collected - Throughout the semester several procedures were used to collect data and provide research relevant to the tutoring services.

a. "Log" sheets were maintained on a daily basis in the Center to record the student use of the services.
b. Questionnaires were distributed in all the math classes toward the end of the semester primarily for the purpose of evaluating the services.
c. Analysis of previous math grades and Spring Semester grades was done in an attempt to determine if there was a difference in performance in math by those students who used the services as compared with students who did not use the services.

Following is a summary of what appeare to this writer to be significant information provided by the data collected from the "log" sheets and questionnaires.

Who Used the Tutorial Services?

a. Of the 173 students who used the services, 86% were pre-calculus students.
b. Students from Math A, C, and D accounted for 60% of the total number of students who used the services.
c. At least 35% of the students who registered in a math class Spring Semester used the tutorial services.

How Often Were the Tutorial Services Used?

a. According to the "log" sheets, at least 173 students used the Center a total of 876 times.
b. The Center was used by pre-calculus students 85% of the time, with students from Math A, C, and D using the services 60% of the time. (There is evidence that not all students signed the "log" sheet each time they used the Center. It is probable that the actual number of times they spent in the Center is greater than 876.)
c. The responses on the questionnaires indicate 44% of the students who used the service returned 5 or more times.

What Reasons Did the Students Give for Not Using the Center?

a. "I did not need any tutoring in math," was the reason given most often for not using the Center (1/3 of the responses).
b. Twenty percent said they did not use the Center because the times available for tutoring were not convenient for them, with an equal number of students selecting "other" as the reason for not using the Center.

What Reasons Did the Students Give for Not Returning to the Center?

a. The reason given 30% of the time was that they did not need any tutoring.
b. Seventeen students said they were not satisfied with the help they received when they did go.
c. Twelve students said the hours available were not convenient to them.

When was the Tutorial Center Used Most Often?

a. The distribution of students using the Center per day was fairly even, with a slightly higher attendance on Wednesday and Thursdays, and the lowest percentage of attendance on Mondays.

b. The distribution of students using the Center per hour was heaviest during the morning hours, from 8 to 11 a.m., gradually tapering off from 11 to 2.

During What Hours Would the Students Prefer the Tutorial Center to be Available?

a. 80% of the response indicated a perference for the Center to be open between the hours of 7 a.m. and 5 p.m. with 75% favoring the hours between 9 a.m. and 3 p.m.
b. 40 students expressed a desire for the Center to be open in the evenings.

How Did Students Rate the Help Given at the Center?

a. In rating the student tutors, 65% of the pre-calculus students said all or most of the student tutors were very helpful. 75% of the calculus students said all or most of the student tutors were very helpful.
b. In rating math instructors, 85% of pre-calculus students said most or all of the math instructors were very helpful. 84% of the calculus students also said most of all of the instructors were very helpful.

What Effect Did Students Feel the Tutorial Center Had on Their Attitudes, Understanding, and/or Grades in Math?

a. Over 50% of the students said their attitude about mathematics had improved since they had been at Golden West, 40% said their attitude had stayed the same, and 6% said their attitude about math had become worse.
b. The students attributed their change on attitude most often to their math instructors at Golden West (66% of the responses).
c. 60% of the students who used the tutorial services attributed their change to their instructors, while 18% attributed the change to their use of the Tutorial Center.
d. 1/4 of the students felt their use of the Center had resulted in their getting better grades in math.
e. 60% of the students who used the Tutorial Center felt their use of the services had increased their understanding of math.
f. Less than 2% said it confused them more than helped them.
g. 14% said their use of the Center made no difference in their performance in math.

How Necessary Did the Students Feel the Center was and How Did They Feel it Compared to Other Sources of Help?

a. 75% of the students felt they would have received the help they needed if there had been no Tutorial Center.
b. Of those students who said they would gotten (sic) the help they needed, 42% indicated they would have gotten it from their math instructor while 47% said they would have gotten help from another student or friend.

c. 20% felt this help would have been better than the Center, 56% felt it would have been as adequate as the Center, and 24% felt the help would not have been as adequate at the Tutorial Center.

What Criticism Was Given Regarding the Center? - Following are comments given most often by students as paraphrased by this writer:

a. Students disliked having to wait for help during the busy hours.
b. They expressed a need for more tutors and quieter facilities.
c. Many felt the Center's hours were not convenient.
d. Higher math students expressed a need for more advanced tutors.

What Did the Students Like About the Center? - Following are comments given most often by students as paraphrased by this writer:

a. A number of students indicated the tutors were always willing to help and were very patient.
b. Some students said they liked the Center because they felt more comfortable getting help from students than instructors.
c. Many students felt it lessened anxiety as it was "always there when you needed help."
d. Students indicated they were able to get more individual attention than was possible in class.
e. A common comment was "it made the difference."

Probably the most important question to be answered with regards to the mathematics tutorial services is did it make a difference in how a student performed in mathematics? As a result of using the services, did he understand math better or get better grades or did it keep him from dropping his math class? According to the questionnaires, the students felt using the tutoring services made a difference or did these things.

An attempt was made to determine if there was, in fact, a difference in the performance in mathematics between those students who used the services and those who did not use the services. From hereon, those students who used the services will be known as Group 1, and students who did not use the services as Group 2. Group 1 was arbitrarily defined as any day school math student at Golden West who used the tutorial services 5 or more times while

Group 2 was determined as any student enrolled in a day school math class (excluding Math 51, A(R), D(R), 7, 42, 44) at Golden West who used the services less than 5 times as recorded on the "log" sheets.

Several comparisons were made between Group 1 and 2 to determine if there was a significant difference in the performance of the two groups. Before the results of these comparisons are given, some of the limitations of the methods used in testing for a significant difference should be pointed out:

1. No attempt was made to match students who used the services with a control group; all students who wanted to use the tutorial services were allowed to do so. One may therefore conjecture that Group 1 is a biased sample simply because of their motivation to use the tutoring services as compared to Group 2 who chose not to use the services. It is probably true Group 1 is a different type of student in the first place and unrepresentative of the population, thus any difference in math performance cannot necessarily be attributed to the use of the math tutorial services.

2. The statistical techniques used for tests of significance had to assume the groups were randomized with regards to instructors, math courses and grading policies. The number of students involved was too small to keep these variables constant for the comparison of any particular group.

Following is a summary of the comparisons made between Groups 1 and 2 and the results of the comparisons.

1. Was there a significant difference between the groups in the performance in their previous math class? Were the students who used the tutoring services better or worse students in math to begin with than the students who did not use the services?

   A comparison of the grade point averages of Group 1 and Group 2 in their last math class showed no significant difference between the groups in their previous grades in math classes.

2. Was there a significant difference in the grade point averages of the two groups as determined by their final grades in maty Spring Semester? Did the students who used the services do better or worse in math Spring Semester than those who did not use the services?

   A comparison of the grade point averages of Group 1 and Group 2 in their final grades Spring Semester in math showed no significant difference between the groups in their performance in mathematics.

3. Was there a significant difference between the groups when their Spring Semester final grades were compared with their grades in their previous math class? That is, did students who used the services do better on the average, or worse in their present math class than they had done previously in math compared with those who did not use the services?

   The difference between the grade point average of the previous math course and the grade point average of the Spring Semester math course was determined from Groups 1 and 2. A comparison of this grade point average difference showed no significant difference between the groups.

Evaluation and Recommendations - From the total number of student contact/hours in the Center and the effect the student said the tutorial services had on their attitudes, understanding and grades in math, one can conclude the Math Tutorial Center was very successful in fulfilling a valuable need for a substantial number of students. In summarizing the evaluations given by students and instructors regarding the Center, greatest benefits of the services seemed to be from the fact that students had the opportunity to receive one-to-one assistance from qualified individuals at the time they needed it.

With the exception of a need for more tutors at peak times during the semester, the facilities, staff and method of operation of the Tutorial Center appeared to be more than adequate for the successful functioning of the Center. The following changes are offered for improvement in the operation of future math tutorial services.

1. More tutor time be concentrated at the beginning of the semester, primarily in the morning hours.
2. A sufficient number of tutors be hired who are particularly qualified in tutoring the subjects of elementary algebra, intermediate algebra, and trigonometry.
3. Student tutors be oriented in how to tutor students. For example, not to spend too much time with one student while others are waiting; not to do all the student's homework; if can't answer question, refer student to an instructor.
4. Consideration be given to offering math tutorial services in the evening.
5. Post the times there will be tutors in the Center who are particularly qualified to assist higher math students.

Producing Media For Medical-Surgical Nursing (Jane Reagan)

This project was prepared to utilize the audio-tutorial laboratory for individual study, to produce a syllabus for Nursing 30 (Medical-Surgical-I) and to prepare some slides-tape programs on selected subjects. Two of these objectives have been completed.

Preparation & Findings -

1. A 175 page syllabus for Medical-Surgical Nursing I was produced and will be ready for student purchase in the bookstore for Fall semester.
2. Approximately 200 slides were made on the subjects of water and electrolyte balance in relation to the patient with gastrointestinal, kidney, and lung problems. Audio-tapes, worksheets, and post-tests were also prepared for these exercises. The results of the post-test indicate that the majority of the students who did all the exercises in the audio-tutorial laboratory scored higher than students who did only the assigned work.

   A questionnaire on various teaching method preferences was given to the freshman nursing students. The results indicated a decided preference for classes having direct teacher involvement and guidance such as lectures, guest speakers, movies and SAS sessions. The majority felt that the audio-tutorial sessions were helpful and should be part of the course requirements. Half the group preferred small groups for viewing the filmstrips and slides while the other half stated a preference for individual viewing and study.
3. The third objective of utilizing the audio-tutorial laboratory for individual study was somewhat limited because not all the equipment for individual students use has not arrived. However, we were able

to evaluate the Graflex Rear-View Slide Projector for individual use. Our conclusions are that the machine is far from student-proof. Each time the machine was used the slides would jam, making it impossible to complete the exercise. Also, the slides slip readily out of the carousel when being handled.

The Dukane Filmstrip A-V-Matic projectors have not yet arrived so that we were unable to evaluate them in relation to individual student learning. We have one which was used for small groups of students. The A-V-Matic appears to be easy for the student to work and handle. Also, it can be placed in the individual carrels in the audio-tutorial lab.

Another aspect of the project was to review commercially prepared media for possible purchase. A number of filmloops, filmstrips, movies, etc., were provided. Our recommendations will be submitted to the Division.

Conclusion - Just a personal comment - anyone wishing to do anything "innovative" must be prepared to meet up with numerous little frustrations along the way. The problems with how to do this and that, and all the red-tape could discourage one. However, even though the results of what has been done are inconclusive on the project, I found that the people who are our backbone - the IMC and multi-media staff, my student typist, the artist doing the drawings, the staff (in particularly the vocational office) bailed me out many times. The student reaction, too, has been just great, so it's been frustrating but fulfilling. It's a real learning experience for this teacher.

CONCLUSIONS AND RECOMMENDATIONS

It is a lot easier to draw conclusions and articulate them along with the material that inspired them than to save them all for the last portion of a paper. In a number of cases, this writer has done just that. As a matter of form, however, and, in an effort to distill the various matters treated by this paper, it will be useful to list some of the more important conclusions that one can draw from the information presented so far.

ADMINISTRATIVE PROGRAMS FOR INNOVATION

1. Innovative development takes place at the faculty level. If community colleges, or any other kind of educational institution for that matter, expect much action in terms of innovative development in designing and implementing learning systems, they should make sure that their teaching faculties have every incentive to do it. It is time to take educational innovation out of the paneled walls of administration and out of the smoky corridors of state and national conferences. If school administrators are serious about bringing about change in instructional strategies, that change is going to take place at the teacher level.

In the view of this writer, one of the administrative programs developed at the Coast Community College District is a case in point. The FUSE Program is essentially administratively oriented. It is concerned with talk, idea generation, and yet more talk. The fact of the matter is, ideas abound in most community colleges. What is often not available is the means to put those ideas to work. An effort like FUSE is doubtless very good in terms of identifying ideas to be pursued. However, the pursuit must be most vigorous,

and specific faculty participation must be supported if an idea is to be productive at all.

2. Community college efforts at implementing administrative programs that solicit faculty involvement are few and far between. As the literature review showed, most community college administrations feel themselves most progressive if they are receptive to ideas presented by faculty, but few administrations, if any, articulate aggressive programs designed to promote faculty involvement. As mentioned earlier in the paper, we need more than this if we are going to be successful at changing the way we do things.

3. Different administrative programs, once established, tend to produce faculty projects that overlap considerably. For example, a number of projects executed under the Faculty Fellowship Program in the Coast Community College District have overlapped into other projects operated as part of the SAL Program. Quite often, this kind of overlap is deliberate, as when a program gets its initial start as a Faculty Fellowship and developmental efforts and continues under the SAL Program.

4. Of the three programs, the Faculty Fellowship program, the Summer SAL Program, and Project FUSE, the Faculty Fellowship and the Summer SAL Program have been much more productive in terms of tangible, educational artifacts, than has Project FUSE. In many respects, Project FUSE can be said to be a committee that was formed in the face of a void of ideas. Once approached by the Chancellor for a number of ideas to increase instructional efficiency, the Office of Educational Development passed the buck to some faculty members and asked if that group could produce some ideas. The buck passing was indeed successful, and a number of edeas were, in fact, produced. There is some question, however, as to whether these ideas have or will be

fruitful in terms of actual innovative development.

5. In making plans for the introduction of programs designed to promote innovation, care must be taken as to what words are used to describe the purpose of the programs. Coast Community College District's mistake in using the term "cost effective" is a case in point. By and large, this writer recommends avoiding that term like the plague and similarly would caution against the use of "cost benefits" and "accountability," this last soon to become an anathema to educators along with "terminal behavioral objectives." The faculty in the Coast Community College District were clearly not receptive to the notion of changing educational methods in a manner designed to make them more cost effective. The lesson learned by this District is important for all schools. The name of the game is improving instructional effectiveness. Whether or not such improvement involves more or less expensive instructional strategies is really irrelevant. An instructional method twice as expensive is well justified if it is five times as effective, given, of course, that it is teaching skills that are valuable to learn to begin with.

EVALUATING COSTS

1. There is a desperate need for an adequate cost accounting system for community colleges. This writer has alluded on several occations to the lack of a cost accounting system for schools in general, and, of course, for community colleges in particular. Without some elementary form of cost accounting procedures, we cannot hope to adequately decermine the costs of our educational programs. Formulas and procedures, however elaborate and well conceived, for allocating total costs of a school district's operation to specific programs and specific courses will not do the job. Moreover, they

contain certain inherent dangers. First, once the formula is established and adopted by school systems, it is very difficult to change. Thus, if one fifth of one percent of a Dean's salary is allocated to French instruction, for example, it may be difficult, if not impossible, to change this allocation in the future, however appropriate such change may seem. We are altogether too familiar with the type of phenomenon that takes place in this regard. "We have always done it that way, why should we change now?"

Second, however well thought out, such allocation schemes as presented by Wattenbarger and by Hienkle are none the less arbitrary in nature and often capricious as well. The little chunk of the Dean's salary allocated to French, to continue the example, may bear no relationship whatsoever to the amount of effort he devotes to the French program. Assuming that it does when it in fact does not, is a bad mistake. Considerable and continuing analysis and probing into the operation of any school system is necessary before costs can be allocated in this manner. This is not to question the efforts of those who have prepared such allocation schemes. It does raise the problem however, that all school systems operate differently. To expect any one system of allocation that works for one district to work categorically for all of them is indeed capricious.

2. Capital investment is very difficult to amortize over different forms of instruction. However one might go about allocating actual costs through the use of a cost accounting system, some fixed charges of an administrative and of a capital outlay nature will nonetheless require allocation based upon some arbitrary formula or standard. Such efforts as produced by Wattenbarger and Hienkle will be most useful to community colleges in handling these operating costs. One comment is in order here, however. By and large, investment

in physical facilities is not treated by school districts in the same manner as businesses treat them. The expense, for example, of constructing a new auditorium is an expense allocated solely to those years during which the auditorium was, in fact, being built. Amortization of the total value of the auditorium over its life is simply not considered, just as it is not considered by government as a whole. This calls for quite a restructuring of the thinking that underlies most school finance today. A five million dollar investment in a building should not be considered a five million dollar cost the year it is expended but rather, as most accountants would maintain, the five million dollars should be amortized over a period of time equivalent about to the length of service expected from the facility.

3. The minor cost analysis presented in this paper has not proven very much with respect to the relative costs of different types of instruction. It would seem that large group instruction is not significantly less expensive than is conventional instruction if one bases his judgment solely upon the examples presented here. Cultural Anthropology seemed to be less expensive, relatively speaking, in large groups than in conventional groups, while Psychology 1A didn't really seem to enjoy any cost advantages at all. Auto-tutorial systems, however, seemed to pay off rather handsomely, again, if one wants to judge solely from the examples presented here. More work in comparing relative costs of instructional systems is clearly in order.

4. It would have been best if this paper could have compared relative costs of a particular learning system and the relative effectiveness of that system as well with conventional instruction. This could not be done. Those few examples in which rigorous analysis of comparative effectiveness are available are such that rigorous cost analysis cannot be performed. The two

examples of instructional effectiveness comparison presented here both involved the use of computer assisted instruction. To this writer's knowledge, this is the only serious effort at evaluating two instructional systems based upon specifically stated educational objectives available in the District. As both of these systems make use of computer assisted instruction it remains then to evaluate these systems in terms of the relative costs of computer assisted instruction as compared to conventional instruction. As the computer system is utilized in the Coast Community College District, however, there is no adequate way to calculate the cost involved in conducting computer assisted instruction. Even if there were, no records are maintained as to the amount of time any one student spends at a computer terminal undergoing computer assisted instruction. Thus, even if we could determine a dollar figure per hour of computer assisted instruction, we have no way of knowing how many hours any one student spent making use of it. Once again, it's a cost accounting problem, complicated by the problem of keeping track of who is making use of what terminals. The District has been loath to formalize the manner in which students make use of computer terminals, feeling that sign-in sheets and other check-in, check-out procedures would tend to dissuade students from participating in this activity. The lack of control that results is probably worth it.

5. What costing systems are available to educational institutions ignore a basic component of cost analysis that businessmen have long used. This is the notion of fixed versus variable cost elements. The simplistic analysis that proposes that a cost of $5.50 per student, thus yielding a cost of $5,500 for a thousand students will simply double if student population increases to two thousand is totally inadequate to the needs of any educational organization.

6. The current brouhaha over planning programming budgeting systems as the most promising new development in terms of bringing about adequate cost analysis of school operations, may be missing the point altogether. There is no question that such a system will provide schools with a new chart of accounts. Whether or not that chart of accounts and the way it is managed will provide the kind of information that school decision makers will use, and whether or not those decision makers will in fact use the information, is quite another question. This is true, of course, of any cost accounting system. The whole matter hinges upon whether or not educators will, in fact, use the new cost information to make decisions about their educational programs. Very little attention is being paid to this overriding question of cost analysis.

7. In the final analysis, differences in costs are probably irrelevant anyway. As many Coast faculty members see it, differences in costs are less important than increases in teacher satisfaciton and perceived effectiveness. This is particularly true, it seems, of the auto-tutorial laboratory experience in Biology 2 at Golden West College. Community college educators run great risks in emphasizing costs too heavily. These risks include alienation of their faculty and a general mechanization of the entire educational process, a process that in the eyes of many, is far too humanistic to be mechanized at all.

EVALUATING INSTRUCTION

1. In general, efforts at evaluating instructional effectiveness are either normative in nature or solicit student opinions as to the quality of the performance. In order for instructional evaluation to be performed most

meaningfully it must be conducted in terms of specific educational objectives that are being taught by the educational program under question. In addition, some rigorous efforts must be devoted to selecting control and experimental groups and in pre- and post-testing the students undergoing the training program. Without these rather rigorous constraints, no real effective evaluation can take place. Unfortunately, this type of thing is very difficult to perform. By and large, teachers are unwilling to have their students treated as guinea pigs and react rather negatively to the whole notion of evaluation efforts conducted in a rigorous, quantifiable manner. After all, many argue, the things I teach, and the people I try to teach it to, cannot be measured in quantified terms. How can you evaluate the quality of my efforts by assigning numbers to these things?

2. More specifically, the difficulties in evaluating instructional effectiveness are four in number. First, and this has been mentioned already, teacher unwillingness to use their students as guinea pigs is the most troublesome problem. Second, conducting comparisons that are, in fact, fair and selecting experimental and control groups that are, in fact, comparable is a most difficult job. Three, establishing criteria of success or criteria of evaluation is also most difficult. Four, the validity of measuring instruments for educational programs is also sometimes difficult to establish. By and large, all four of these difficulties combine into a total situation that makes the researcher's job most difficult.

3. One instructional system of most interest to the Coast Community College District was not evaluated in this paper. This instructional system is television. The District is devoting considerable effort to installing a telecommunications center equipped for broadcast television as well as distrib-

ution of televised material through cable networks and other closed circuit systems. This cannot be evaluated at this time because it is too new. The District has not yet begun operations making use of television.

RECOMMENDATIONS

This will probably be the only paper of this nature that does not recommend further research. In the view of this writer, we have adequate research to demonstrate that our educational programs in community colleges are in need of revamping. A rough comparison of the number of students who graduate with the number of students who enrolled as freshmen two years earlier is enough to convince most that community colleges somehow are not producing finished products. Attrition rates, failure rates, and open student protests over the relevancy of the instructional program are evidence enough of all of this. What is needed is not more research to find out if something is wrong. What is needed are action programs designed to try to find a way to solve the problems. Maybe these action programs are, in fact, research in nature. Chances are, however, they will be more productive if they concentrate on improving instruction and improving student satisfaction with instruction.

The few efforts undertaken in the Coast Community College District to change things show some signs that they are improving student performance. This is true, particularly, in English, both at Orange Coast College and at Golden West College, and in biological science at Golden West College. Drop-out rates in these programs tends to be lower as some of the statistics presented earlier in this paper attest. Similarly, student performance and, in general, the quality of the program seems to be higher, particularly in the eyes of the instructional staff, and in the eyes of the students too.

It's doubtful that any one panacea is going to be found that will solve all of the problems faced today by community colleges. The best we can hope for, it would seem, is a college institutional environment not only conducive to change and to self-evaluation but one that actually promotes and supports it. From what this writer has seen, we have quite a way to go yet.

APPENDIX I

FACULTY FELLOWSHIP PROJECTS

AUDIO-VISUAL AIDS

Psychology Lecture-Seminar Development, Dean Burchett (Approved 11-69 OCC)

This project will elicit the involvement of the entire Psychology teaching staff in the determination of a development of course materials, audio-visual aids, and the definition of behavioral objectives. The project will prepare materials designed to serve students having academic difficulty as well as presenting topics which are not typically covered in class adequately.

Audio-Visual Segments For The Rhetoric Of The Sentence, Thomas Heaney (Approved 1-70 GWC)

This project will develop a handbook and audio-visual segments dealing with the teaching of sentence rhetoric. Students will make use of the audio-visual segments in a reading skills laboratory. The handbook will outline methods by which English instructors may make use of the segments in their courses.

Sound-On-Slide French and German, Larry Bennett and Lyn Bonin (Approved 4-70 OCC)

These two projects will each develop instructional packages covering difficult areas in French and German. Each instructional package will consist of 3 x 5 slides showing graphic representations of points of grammar and each slide will be accompanied by 35 seconds or so of spoken commentary on the point. Each set of slides will be covered by a short test to be used by students to evaluate his degrees of achievement.

Synchronized Sounds and Slides For Economics 1A, Spencer Carle (Approved 4-70 GWC)

The purpose of this fellowship is to prepare a synchronized sound and slide presentation of three sections of Economics 1A so that students will more effectively learn the techniques versus the theory of the material.

Visual Aids For Electro-Mechanical Drafting, John North (Approved 4-70 GWC)

This project will prepare a set of overhead transparencies for use in teaching Electro-Mechanical Drafting. Each transparency will cover a basic concept germane to Electro-Mechanical Drafting.

Visual Aids for Technical Illustration, Eldon Durham (Approved 4-70 GWC)

This project will prepare a set of overhead transparencies for use in teaching Technical Illustration. Each transparency will cover a basic concept germane to Technical Illustration.

Student Aids For Tool Design and Manufacturing Technology, Linden Orgill (Approved 4-70 OCC)

This project will prepare large flip charts to be used in courses in Tool Design and Manufacturing Technology. These will be used in the classroom for lectures and during laboratory periods for student references as well as for out-of-class review.

Visual Aids For Graphic Arts Technology, Gene Tardy (Approved 11-70 GWC)

This project will prepare transparencies and slides for use in graphic arts at Golden West College. The visual aids prepared here will provide students with opportunities to review problems and techniques in the area of graphic arts while studying in the media center.

Student Aids for Engineering/Drafting Classes, Linden Orgill (Approved 11-70 OCC)

Mr. Orgill wanted to continue development of flip charts for technical drawing courses. In this proposal, he is asked to develop his drawings for display on a microfiche reader. The illustrations will cover areas of instruction that precede new design problems. The final few sheets in each lesson set will give a detailed method for solving a sample problem. These problems will be valuable references to students during laboratory periods. All students in the drafting/design classes will find them useful.

Sound-On-Slide For French Grammar, Larry Bennett (Approved 3-71 OCC)

Mr. Bennett will continue work started last year in the development of sound-on-slide materials for French grammar. This project will also evaluate the effectiveness of the units completed.

Sound-On-Slide For German Grammar, Adelyn Bonin (Approved 3-71 OCC)

Miss Bonin will continue work started last year in the development of sound-on-slide materials for German grammar. This project will also evaluate the effectiveness of the units completed.

Visual Aids For Geology-Geography, Wallace Kleck (Approved 3-71 OCC)

Mr. Kleck will prepare a set of 35mm slides taken from the air over Orange County and which pinpoint local geological and geographical features. These slides will be used in geography and geology courses at Orange Coast.

Writing The Research Paper, Cherry Sundry (Approved 3-71 OCC)

This project will prepare a number of sound-on-slide learning segments treating techniques to be used in writing research papers. The final product will consist of thirteen units dealing with the use of library tools and with planning and organizing research papers.

COMPUTER ASSISTED LEARNING

Computerized Chemistry Review Problems, Roscoe Lancaster (Approved 11-69 GWC)

This project will prepare nine supplementary problem sets to be used by chemistry students. The problems will be executed on computer terminals and will consider formulas and composition, chemical equations, measurements of gases, concentration of solutions, reactions involving solutions, chemical equilibrium, ionic equilibrium, solubility, and nuculear chemistry.

Windjammer Accounting System, Richard Howe (Approved 11-69 OCC)

This project will develop an accounting system for use by the Windjammer store. Students will be directly involved in developing the accounting system and in preparing computer programs to implement it. When completed, the accounting system will serve as a model for accounting and data processing students as well as serving accounting needs of the store.

Computer Operations and Job Control Language, John Clark and Don Hayes (Approved 1-70 OCC)

This project develops computer models that simulate the operation of computer systems and their job control language characteristics for use by students in the data processing occupational program. The models will be executed on APL terminals in a computer-assisted learning sense providing individualized instruction in this critical area of training. The project will produce a workbook to be used in conjunction with the terminal activities.

Computer Assisted Instruction In Physics, Robert Sum (Approved 4-70 GWC)

This project will prepare a series of teaching segments for single concepts of physics. Each segment will develop a particular segment and will include drill in typical calculation using the concept.

Synchronizing Calculus With The Computer, Angelo Segalla (Approved 11-70 GWC)

This project involved the production of a calculus syllabus and accompanying computer programs to aid students in learning that subject. Mr. Segalla will prepare a syllabus outlining various calculus concepts, a glossary of the necessary computer languages used, and a number of CAI programs to implement computerized instruction in calculus.

Computerized Accounting Practice Set, Richard Howe (Approved 11-70 OCC)

This project will produce a practice set for use by Accounting 1A and 1B students at the APL terminals. The project will also provide accounting students with an introduction to the use of computers and on-line computer terminals to accountants.

CAI For Photography As Art, John Wordes (Approved 3-71 GWC)

Mr. Wordes will create and produce two sample models that will be used in Art 20, Photography as Art. The first model will cover technical and aesthetic concepts of composition. The second model will cover the technical and aesthetic concepts of night photography. The project will utilize computer terminals and microfiche devices in presenting information to students.

Computers and The Calculus, Part II, Angelo Segalla (Approved 3-71 GWC)

Mr. Segalla will make use of the highly mathematical nature of computers to illustrate and demonstrate a number of calculus concepts. Computer terminals will be used in conjunction with microfiche display units and will, says Angie, "bring the computer right into the calculus classroom."

Self-Instruction In Present Value, Spencer Carle (Approved 3-71 GWC)

Mr. Carle will prepare three computer programs that will provide instructional information and randomly generated problems dealing with the concept of present value. The program will enable students to learn at their own pace and will provide them a more varied exposure to different problems and applications than is possible in class.

CAI For Math 154, Bob Denton (Approved 3-71 OCC)

Mr. Denton will prepare CAI materials dealing with material presented in Math 154, mathematics course serving students other than physical science majors. The materials prepared will result in the complete reorganization and rescheduling of the course.

Demand Reporting Systems For The Windjammer, Richard Howe (Approved 3-71 OCC)

Mr. Howe will develop a demand reporting system for the Windjammer Store at Orange Coast College. This system will provide a valuable teaching vehicle for all classes in retailing, merchandising, buying, and small business management. It will give students a valuable opportunity ot make use of a data processing system not unlike many that are found in industry today.

AUTO-TUTORIAL; MULTI-MEDIA SYSTEMS

Auto-Tutorial Project For Anatomy-Physiology 1B, Norman Rich (Approved 11-69 GWC)

This project will do for the second course of the anatomy-physiology series what Mr. Rich did for the first course during Project SAL. The project will develop outlines, course behavioral objectives, carrell materials, demonstration experiments, physiographic records, and supplementary workbook exercises and experiments. The materials will be evaluated in terms of how well they help the student meet the behavioral objectives of the course.

Individualized Reading Improvement, James Baugh (Approved 11-69 GWC)

This project will develop self-instructional, audio-tutoriallv-oriented learning experiences for the purpose of reading improvement. Three junior colleges will be visited for the purpose of examining outstanding reading programs. After this examination and after a comprehensive review of current materials available, syllabi, slides, audio tapes, and diagnostic materials will be prepared.

Students making use of the materials will complete a battery of diagnostic tests and will undertake appropriate work as indicated by the test results.

Quantifying and Qualifying English 1A, Richard Ridenour (Approved 11-69 GWC)

This project will identify and isolate those segments of freshman composition which are compatible with individual learning exercises implemented through the use of equipment available at the learning resources center, namely, audio tape, slides, and computer terminals. This project is the first of several phases of work to be accomplished towards making use of the array of instructional media available for the teaching of English. Subsequent phases will produce slides, text materials, and computer programs associated with the long-range plan.

Multi-Media Slide Rule Course, Ron Schryer (Approved 11-69 OCC)

The project will prepare materials now used in the Math 52 course to be presented by computer terminals. The subject matter deals with slide rule operations and using this tool to solve various mathematical and engineering problems.

Golden Keys Typing Laboratory, Joyce Kupsh and Maxine McCann (Approved 1-70 GWC)

This project will develop an audio-tutorial laboratory for the purpose of teaching basic typing skills through individualized instruction. A bilingual approach will be investigated with a view toward serving the Mexican-American community that predominates in certain areas within our District. Traditional classroom instruction will be replaced by the use of visual audio-tutorial methods and individual study.

Media Production for Medical-Surgical Nursing, Jane Reagan (Approved 1-70 GWC)

This project will continue work begun last summer in developing audio-tutorial instruction techniques in nursing education. The project will produce audio tapes and slides to be used in the audio-tutorial laboratory.

Multi-Media Approach To Physical Science, Ronald Gibson (Approved 1-70 GWC)

This project will take the initial step in converting the Physical Science 1-1L course from a standard lecture-laboratory offering to an audio-tutorial format. The project will produce a set of terminal behavioral objectives, a new course outline, a series of 35mm slides for each learning unit, and preliminary outlines for each learning unit.

Programmed Study Of Concepts and Events In United States History and Political Science, Norman Lumian (Approved 1-70 OCC)

This project will organize and write a series of teaching supplements treating specific concepts and events in United States History and Political Science. Media employed in presenting the concepts and events to students will involve audio-visual and computer devices. Students will undertake study of the materials outside of class as supplementary or review activities.

Anatomy-Physiology 1B Project, Norman Rich (Approved 4-70 GWC)

This project will complete the preparation of materials for use in Anatomy-Physiology 1B begun earlier in the school year. The materials completed will be fully operational by September, 1970, and will consist of audio-tutorial learning experiences used with such major units of study as blood and immunity, the cardiovascular system, and body fluids and the urinary system.

Anatomy and Physiology For Allied Health, Hueston Harper (Appreved 4-70 OCC)

This project will involve development of a new course in Anatomy and Physiology that will meet the needs of students in the Allied Health Professions by condensing the present two courses into one. Visual aids and demonstration materials will be prepared based on the principle that students learn more by a combination of doing and seeing than by being told about principles in lecture.

Audio-Tutorial Physical Science, Ron Gibson (Approved 11-70 GWC)

Mr. Gibson's project will result in a complete audio-tutorial multi-media approach to the teaching of Physical Science. The completed course will provide students with a general survey of the physical world around them in a far more stimulating manner than possible under present conditions.

Math 100 Teaching Aids, Jack Wadhams (Approved 11-70 GWC)

Mr. Wadhams' fellowship will result in an operational Math 100 course organized into individual learning units utilizing several different kinds of media. The course will cut across divisional lines and will utilized talent available on campus from a variety of sources.

Teaching Kits For The Tutorial Center, Char Mecke Smith (Approved 11-70 OCC)

This project will prepare a number of teaching kits to be housed in the tutorial center for use by tutors and by community volunteers including Orange Coast students and faculty members. The kits will include bibliographies, lists of media materials available in the library, learning games, drills, sample problems, and other learning materials that tutors will find useful when trying to help students who come to the tutorial center.

Auto-Tutorial Learning Systems For Sociology, James R. Long (Approved 3-71 GWC)

Mr. Long will develop an experimental auto-tutorial learning segment illustrating three basic concepts in Sociology. This segment will be designed to meet the needs of students for varied and supplemental media outside the classroom. In addition, Mr. Long will prepare a syllabus providing direction for using the segment.

Media Organization For Health Science, Mary Gradishar (Approved 3-71 GWC)

This project will prepare a new syllabus for Medical-Surgical Nursing I to be used for a class starting in September, 1971. It will organize a number of different multi-media instructional systems into a study laboratory not unlike the auto-tutorial laboratory now operated at Golden West College for Biology 2.

Multi-Media Package On Film Making, Harvey Clemens (Approved 3-71 GWC)

Mr. Clemens will produce a package of slides and tapes teaching the art of film making. These will facilitate better understanding of filming techniques than is currently possible using conventional instructional methods. The completed project will serve as a model for future packages like it to be used in a new film-art class to be offered in the Fall of 1971.

Multi-Media Geometry, Jeff Dimsdale (Approved 3-71 OCC)

This project will develop individual learning units in geometry consisting of sound-on-slide materials, computer assisted learning programs, microfiche, audio tape, and video tape.

AUDIO-TAPE DEVELOPMENT

Music Tapes and Syllabus For Humanities 4, Warren Peterkin (Approved 1-70 GWC)

This project will complete the development of course syllabi and listening tapes began on a SAL project for Humanities 4, History of Music. The tapes and syllabi will be ready for use in the Fall Semester, 1970.

Music 1B Tapes, Tom Hernandez (Approved 4-70 GWC)

This project will prepare a set of music dictation tapes that students can use to practice the taking of dictation in rythm, pitch, and harmony. These tapes will permit students to select individual programs of practice in learning these skills and will release classroom time now spent for group drill.

Taping The Canterbury Tales, Stewart Rogers (Approved 4-70 GWC)

This project will provide tapes in middle English of The General Prologue to The Canterbury Tales and a number of other prologues and tales. The tapes will include text plus explanations for pronunciation and meaning as well as some editorial comments. The tapes will be for specific use in English 46A, Survey of English Literature.

Exercise Tapes For German, Rudolph Debernitz (Approved 3-71 GWC)

Mr. Debernitz will develop exercise tapes to be used for supplemental review work in German 2, 3, and 4 at Golden West College. Regular class sessions do not allow enough time for sufficient practice in speaking the language. These tapes will enable students studying German to practice at their own pace.

Listening Tapes For Solfege, Justin Colyer (Approved 3-71 OCC)

Mr. Colyer will prepare listening tapes in harmonic and rythmetic dictation for solfege. These will duplicate material similiar to that presented to students on examinations. They will afford students the opportunity to practice and develop essential music skills.

Russian Conversational Manual and Tapes, Irina Berger (Approved 3-71 OCC)

Mrs. Berger will write a Russian conversational manual and will prepare audio tapes illustrating spoken Russian. These tapes will be prepared by a number of different individuals so that students are exposed to voices and accents other than that of their instructor.

Tapes and Syllabus For History and Literature Of Music, Joseph Pearlman (Approved 3-71 OCC)

Mr. Pearlman will produce a course syllabus and listening tapes to be used in Music 33A and 33B. This course deals with history and literature of music and is offered specifically for music majors. The tapes will cover periods of style and of music from ancient Greece to contemporary times. Examples on the tapes will be keyed to the text used in Music 33A-B and the tapes will be indexed so that specific musical examples may be located at will and withdrawn from the tape library for listening.

VIDEO-TAPE; FILMS

Psychology 33 Tapes, Lee Bradley (Approved 11-69 OCC)

This project will prepare a series of 10 video tapes presenting personality adjustment experiences used in the Psychology 33 course. The tapes will include materials of an introductory nature to the course as well as review materials.

Single Concept Film Series In Mathematics, Jeffrey Dimsdale (Approved 11-69 OCC)

This project will develop a series of single concept films each dealing with a specific area of mathematics with which students experience difficulty.

Accounting 1 Video Tapes, Don Genet and William Owens (Approved 11-70 GWC)

This project will prepare a number of video tapes to be used as supplementary instruction in Accounting 1 at Golden West College. The tapes make possible a problem-by-problem check for students at a time when they are actually doing the work. The tape will be housed in the Library Multi-Media Center.

Video Tapes in Philosophy, Pierre Grimes (Approved 11-70 GWC)

Dr. Grimes' project will prepare a video tape covering a major concept in Philosophy. This tape would be a first in a series of nine tapes to be produced, the entire series being known as "Introduction to Philosophy."

Television Pilot in Cultural Anthropology, Dwayne Merry (Approved 11-70 OCC)

This project will produce a thirty-minute video tape program in cultural anthropology. It will also research materials with a view toward additional production of thirty-minute programs. A total of 40-45 such programs would cover the entire course in cultural anthropology. Lecture materials, slide and film illustrations, plus taped field trips will be available for viewing either by individual students in carrells, by groups in lecture halls, or over home television receivers. Slides, graphics, and film clips will also be developed to enhance forum presentation for the current course in cultural anthropology.

TV Pilot For The Arts, John Ferzacca (Approved 11-70 OCC)

This project will prepare a video tape on one facet of theater arts as presented by a recognized professional actor, director, or playwright. This TV tape will offer students a permanent record of the work of a respected artist involved in acting, directing, or playwrighting. This tape will expose students and faculty members to a variety of techniques that should contribute to their growth as artists or as teachers.

Americans Love Music, Henry Panian (Approved 3-71 OCC)

Mr. Panian will produce a 45-minute video tape program on United States History. This program will review basic historical periods and events in terms of music popular during the time. The project will be used to supplement current United States History materials and course offerings and also as a motivational device.

Cinematic Aids In Humanities, Bruce Piner (Approved 3-71 OCC)

Mr. Piner will create several short films each of three minutes duration or so. These will encapsulate art styles of historical periods being studied. Presently there are no available films that cover art, literature, music, and ideas. These materials will add to the variety of presentations now offered to large group instruction in humanities.

SYLLABI; SCRIPTS

Multi-Media Approach To Math 51, John Wadhams (Approved 1-70 GWC)

This project will prepare behavioral objectives for Math 51 and will begin work leading to the completion of a multi-media mathematics laboratory. Existing hardware and software will be evaluated in terms of serving this long-range objective. The project will produce a new syllabus for Math 51, a set of learning units to be followed by students, and a set of guidelines for establishing the math-science learning center.

Organization Of English B, Ruth Hunter (Approved 11-70 GWC)

Miss Hunter will bring English B into line with the other English offerings at Golden West College. The English B objectives and course content will correlate with those of English A. These will involve the preparation of study units and visual materials and will represent the logical completion of specific instructional segments in English.

Revised Mathematics Scripts, Lloyd Wilcox and Harvey Reynolds (Approved 11-70 GWC)

This project presents another in a series of steps to bring the math science division courses into an organized sequence. The project will prepare ten sets of scripts to be used in the implementation of audio-tutorial courses for the use in the Fall 1971 semester.

MISCELLANY

Programmed Concepts In United States History and Political Science, Norman Lumian (Approved 11-69 OCC)

This project will prepare three or more pilot teaching supplements in the area of United States History and Political Science. Mr. Lumian has defined over 200 specific concepts pertinent to the subject matter which lend themselves to programmed instruction supplemented by various audio-visual devices. He estimates 25 to 30 hours of preparation for each of these concepts. These initial few, if successful, will serve to justify an extensive program devoted to developing all of the concepts.

Project Feedback, Henry Panian (Approved 11-69 OCC)

This project will provide the time and wherewithal for instructors from the Social Sciences Division to visit four-year schools to which Orange Coast students transfer. The visits will provide opportunities for the instructors to personally interview ex-Orange Coast students with a view to influencing curricula and instructional methods.

Mathematics Tutorial Center, Maurice Smith and William Stanley (Approved 1-70 GWC)

This project will establish a mathematics tutorial center to provide tutorial assistance for all mathematics students. Second-year mathematics students will act as tutors. An integral part of the project consists of follow-up research conducted by the college counseling center for the purpose of assuring more appropriate development of the mathematics laboratory for the building addition to be completed in 1973.

Operation Up-Date, Ed Parsons (Approved 4-70 GWC)

This project will redesign curriculum offerings in the Manufacturing Technology program in view of current industry needs and will produce modules of instruction designed to provide learning experiences to prepare students to meet those industry needs. A number of learning strategies will be employed, including audio-tutorial programmed instruction, open laboratory, and in-service training.

Evaluation Of CAI In English, Anna-Marie Thames (Approved 11-70 GWC)

Mrs. Thames' proposal will evaluate CAI programming efforts as employed in the teaching of English at Golden West College. The final product will consist of a written report including summaries of statistical and observational analysis.

Faculty Information Booklet On Teaching Classes Containing Deaf Students, Mike Goodman (Approved 11-70 GWC)

This project will provide a tool useful to all instructors who find themselves working with hearing-impaired students. It will prepare a pamphlet applicable throughout Golden West and at Orange Coast College which will acquaint instructors with the special problems of deaf students and special techniques necessary to deal with them.

Garment Alterations By Body Angle Measurements, Barbara Beckley (Approved 11-70 OCC)

This project will develop a unique approach to the design and alteration of clothing. The final product will consist of a classroom technique of determining the kind of alterations to be made to a particular clothing pattern with respect to fitting the body dimensions of a particular person.

Occupational Ladder, Hal Schrupp (Approved 11-70 OCC)

This proposal is designed as a pilot project to survey ten occupational programs at Orange Coast College and identify points during the programs at which students could logically leave and find gainful employment.

Sight and Sound In A Domed Environment, Karen Mortillaro (Approved 11-70 OCC)

This project will experiment with the development of techniques to project images on the ceiling of the planetarium. In this way it is hoped to simulate an entire environment and, with the addition of sound, to present a most realistic atmosphere. The initial project will develop the materials concerning eskimos and eskimo art.

Humanities I Multi-Testing, Robert A. Schiffner (Approved 3-71 GWC)

Mr. Schiffner's project will prepare materials currently used in Humanities I for implementation through APL computer terminals in conjunction with microfiche display units. Students will test their knowledge and understanding of forum lectures and text reading assignments. Microfiche units will present visual images covering a number of periods in art history.

Readers' Guide To Periodical Literature, Virginia Alleman and Mariana Grazaitis (Approved 3-71 OCC and GWC)

This project will develop audio-visual approaches to teaching the use of the Readers' Guide to Periodical Literature, one of the most useful of library tools. This is a joint venture conducted by library staffs at both Golden West and Orange Coast. The program will be made available in the libraries at both colleges and will enable individual students to learn how to use the Readers' Guide and to reinforce past training.

Credit By Examination For Mathematics 5, 10, and 110, Maurice Smith and Lloyd Wilcox (Approved 3-71 OCC)

This project will develop a model credit by examination system for certain mathematics offerings. Examinations will be based upon locally valid criterion measures that will be developed for the purpose. The model will be implemented within existing college policies as a pilot program for further work in the area of credit by examination.

Instructional Worksheets For Graphic Geometry, Gerald Ellis (Approved 3-71 OCC)

Mr. Ellis will develop a series of instructional laboratory worksheets for the 9-week unit offered in graphic geometry as part of Engineering 27 - Engineering Graphics. Materials prepared will replace an expensive textbook that is only partially appropriate for the class.

APPENDIX II

SUMMER SAL (SYSTEMS APPROACH TO LEARNING) PROJECTS

AUDIO-VISUAL AIDS

Art/History, Rob Schiffner, (Summer, 1968)

This project completed a number of art/history color slides and prepared audio tapes and work-think exercises to accompany each series of slides. These materials are made available in the Multi-Media Center at the Golden West College campus.

Technical Drafting, Eldon Durham and Jack North (Summer, 1968)

This project developed visual materials on ortho-graphic projections for the course in technical drafting. These materials will eventually be used in an audio-tutorial system teaching aspects of the course.

Video Tapes and Films, Fine Arts/Painting, John Wordes (Summer, 1968)

Mr. Wordes completed a color film which began during the summer of 1967 which demonstrate painting techniques. Eight sound tracks accompany each paint demonstration shown in the film.

Audio-visual Approach To Teaching Chemistry, Roscoe Lancaster (Summer, 1969)

This project is developing behavioral objectives for Chemistry 2 and will complete nine different laboratory experiments and the first draft of a laboratory workbook.

Flip Charts and Slides For Technical Drafting, Eldon and John North (Summer, 1969)

This project has completed seven original and 143 modified flip charts used for courses in technical drafting. These flip charts are being used as photo-ready copy for color slides to be used in these courses and by auto-tutorial systems that can use slide projectors.

Visually Recorded Units On Painting Instructions, John Wordes (Summer, 1969)

This project planned to complete four demonstration films on painting techniques for use in art classes. Demonstration films could not be produced as initially planned because of a number of technical difficulties. However, a number of study units employing 35mm slides were completed and are being used by art classes.

Slides and Tapes For Art History, Rob Schiffner (Summer, 1969)

This project produced a number of prehistoric and renaissance art slides. In addition, a script for audio tapes to accompany these slides was produced.

Audio-Visual Materials For Chemistry, Thomas Ackeret (Summer, 1970)

This project produced audio visual materials for large group instruction in chemistry. One hundred and eighty slides and 335 overhead projection transparencies were catalogued and arranged by this project.

Systems Approach To Teaching Nursing, Jane Reagan and Pauline Smith (Summer, 1970)

This project prepared audio tapes, video tapes, and slides for new nursing students so that they could have opportunities for self-paced learning experiences. The project also prepared a new nursing syllabus.

Tapes and Slides For Art Appreciation, Rob Schiffner (Summer, 1970)

This SAL project continued work begun in the summer of 1969. The project completed the duplication of all slides for use in large group instruction and by individual study units in the Multi-Media Center. It also completed a course syllabus and catalogued all available slides that are used by the system.

Tapes, Films and Syllabus For History and Appreciation of Jazz, Gerald Schroeder (Summer, 1970)

This project organized materials for a syllabus which would be fitted with recording books and video tapes for a course in the history and appreciation of Jazz. Audio tapes, books and video tapes are made available to the students and to the community at large.

COMPUTER ASSISTED LEARNING

CAI For Mathematics, Jack Wadhams (Summer, 1968)

This project developed three course segments for remedial mathematics dealing with set theory, inequalities, and absolute values.

Business Games, Don Genet (Summer, 1968)

This project developed business games to be worked out in a problem-solving mode with the use of computer terminals.

English, Ana Marie Thames (Summer, 1968)

Mrs. Thames produced CAI course segments developed to assist students in learning paragraph writing.

Computer Assisted Learning For Data Processing, Donald Genet (Summer, 1969)

This project prepared computer assisted learning segments for Introduction to Data Processing, Data Processing 3. The project produced a number of computer programs, a syllabus for the course, and a group of video tapes covering a survey of the data processing field, and matters pertaining to the application of business mathematics using the computer.

Computer Programming For English D, Anna Marie Thames (Summer, 1969)

This project established whether existing needs in the remedial English program could be met through the use of computer and determine whether new methods of teaching the remedial English course could be defined through a knowledge of computer capability.

Computer Assisted Learning Of Algebra, John Wadhams (Summer, 1969)

This project completed five sequences of instruction consisting of video tapes, branching tutorial-type computer programs, and pre- and post-tests for use in the instruction of algebra.

Audio-Visual and CAI Programming For Chemistry Instruction, Roscoe Lancaster (Summer, 1970)

This project completed the work begun with the initial SAL program in Chemistry 2 conducted during the summer of 1969. Mr. Lancaster completed the computerized problems set for this course, wrote scripts for the master tapes, and prepared video tape demonstrations and laboratory techniques and chemistry principles.

Revision of CAI Programming For Remedial English, Anna Marie Thames (Summer, 1970)

This project continued work begun by Mrs. Thames on her initial summer SAL program to develop CAI programs for remedial English.

AUTO-TUTORIAL, MULTI-MEDIA SYSTEMS

Anatomy/Psysiology, Norman Rich (Summer, 1968)

Mr. Rich completed materials begun during the Spring semester of the school year 1967-68 by preparing audio tapes and implementing them in a new audio-tutorial laboratory.

Remedial English, Edith Freligh (Summer, 1968)

Miss Freligh completed preparation of tapes and visual materials for use in the new 80-station audio-tutorial laboratory.

Audio-Tutorial Chemistry, Roscoe Lancaster (Summer, 1968)

This project performed developmental work on a program begun the previous summer. Preparation of tapes and laboratory manuals was accomplished. The project was assisted by the League for Innovation in the Community College.

Nursing Education, Olive Rees and members of the nursing staff (Summer, 1968)

The nursing staff developed a number of audio-tutorial programs for first courses in nursing. The project was assisted by visual materials developed at Delta College at the League for Innovation workshop.

Physical Science, Ron Gibson (Summer, 1968)

Mr. Gibson developed audio-tutorial segments to assist learning in present physical science laboratories. This project leads eventually to an entire audio-tutorial technique of teaching physical science.

Auto-Tutorial Remedial English, Edith Freligh (Summer, 1969)

This project converted the remedial English course from four large-group forum lectures each week to an auto-tutorial method of teaching which includes one hour of lecture and four hours of lab each week.

Auto-Tutorial System For History and Appreciation Of Music, Warren Peterkin (Summer, 1969)

This project developed a syllabus for the course Humanities 3, History and Appreciation of Music, and also produced ten listening tapes for the course as accompanied by the written syllabus.

Auto-Tutorial Anatomy Physiology 1A, Norman Rich (Summer, 1969)

This project prepared auto-tutorial learning systems for the Anatomy Physiology laboratory course conducted at Golden West. The project prepared course outlines, developed course objectives, and implemented carrel software, video tapes, and other demonstration materials.

Auto-Tutorial Nursing, Members of the Nursing Division (Summer, 1969)

This project prepared multi-media materials for the first course in nursing. These materials include slides and audio tapes and involved the preparation of course objectives, study guides and pre-tests.

Auto-Tutorial Conversion Of Physical Science Instruction, Ronald Gibson (Summer, 1970)

This project converted physical science courses from a lecture-laboratory approach to an auto-tutorial approach, allowing students to use live filmstrip models as concepts in physical science are being discussed. In addition, students have the opportunity to handle and examine specimens during the discussion.

Auto-Tutorial Analysis Of Sentense Development, Thomas Heany (Summer, 1970)

This project was developed to give all students an opportunity to improve writing skills through improved sentence development. Slides and tapes were prepared and made available in the Golden West College Multi-Media Center. In addition, the project prepared a student workbook.

Quantifying and Qualifying English 1A Through Tape Slides and Computer Assisted Learning, Richard Ridenour (Summer, 1970)

This project prepared audio tapes, visual slides, and computer programs in an effort to offer English students the opportunity to study difficult concepts in English composition at his own pace.

Psychology As A Science, Joel Roosevelt (Summer, 1970)

This project prepared tape lectures and visual slides of specific concepts in Psychology. Also, Mr. Roosevelt developed a number of computerized self-test questions in which incorrect responses elicit immediate feedback to students so as to reinforce correct responses and to help students correct errors.

Audio-Visual Materials For Tutorial Laboratory In Mathematics, Members of the Mathematics Division (Summer, 1970)

This project has developed a set of multi-media learning units, utilizing audio tapes, video tapes, slidestrips, and an attitude accessment test for mathematics courses.

AUDIO TAPES

Instructional Tapes For Practice In Theater Speech, Charles Mitchell (Summer, 1970)

This project prepared instructional tapes for use in the Multi-Media Center by students in the course Theater Speech. By using the tapes, students could hear themselves deliver speeches and could work for improvement upon diagnosing specific problem areas. In additon to the tapes, the project prepared a syllabus and a detailed course outline.

Piano Teaching Tapes, Warren Peterkin (Summer, 1970)

This project prepared tapes designed to be used in conjunction with a Wurlitzer Electronic Communications Center for beginning piano classes. These tapes allow 25 students at once to use identical lesson and practice sessions.

VIDEO TAPES, FILMS

Swimming Instruction, Thomas Hermstad (Summer, 1968)

Mr. Hermstad prepared six motion picture films demonstrating six basic swimming strokes. These films are used in physical education courses.

Production Of Instructional Swimming Films Project, Thomas Hermstad (Summer, 1969)

This project prepared a number of films dealing with swimming and is used in the instruction of swimming by the Physical Education Department.

Accounting Principles and Procedures On Video Tape, Donald Genet and William Owens (Summer, 1970)

This project prepared a number of videotapes to supplement a new approach in teaching accounting at Golden West. In this approach, accounting students would review essential accounting concepts by viewing video tapes and repeating their exposure to the concepts as necessary.

APPENDIX III

PROJECT FUSE ACTION PLANS

DIAGNOSTIC CENTER

This project was to design pilot programs providing diagnostic review of all incoming students to take place at a diagnostic center. On the basis of the diagnosis, the center would prescribe a course of study for remedial purposes if needed. To date, Golden West College has started a Mathematics Tutorial Center and reports its considerable success. Similarly, Orange Coast College has started a tutorial center under the support of the Faculty Fellowship Program.

PERFORMANCE CONTRACTING AND INDEPENDENT STUDY

A system was to be devised by which a student could contract with his instructor, and with other college officials as necessary, to perform a particular learning experience. On demonstration of his performance, course credit was to be awarded. At the present time, the Golden West College Catalog now indicates that course credit may be awarded for work experience or for independent study. Orange Coast College is currently operating a system under which students enter into contractual agreements with instructors and the dean of instruction for credit for work done on an independent basis.

EXAMINE AND REDESIGN OF CLASS SCHEDULING PATTERNS AND PROCEDURES

This project suggested that the district research director could identify specific information needs required for effective scheduling of students and classes. He would have identified reports now being produced which are redundant and otherwise unnecessary with a view toward discontinuing their production. An individual was to be hired for the purpose of preparing an in-depth study of enrollment patterns. This study would have recommended ways of improving class scheduling efficiency. Some administrators have taken initial steps in reviewing their information needs as of this writing.

INTERPERSONAL STUDENT-FACULTY-ADMINISTRATION AND DISCUSSION GROUPS

Teams of faculty, students and administrators were to conduct regularly scheduled discussion groups. Golden West College staged a retreat in the Spring of 1970 for the purpose of planning for operations this fall.

ORGANIZATIONAL ANALYSIS

FUSE examined the organization of the Coast Community College District with respect to the relationships among Orange Coast College, Golden West College, the Summer School, the Evening College, and the District Administration. All members of Project FUSE participated in this project and prepared a report outlining recommendations to change the present organizational structure. This report was delivered to the District Chancellor late in June. On November 12, 1970, Project FUSE received a memorandum from him outlining the advantages and the disadvantages of both vertical and horizontal organization models for community services and adult education. His memorandum concluded that there is no evidence indicating that the adult education and community services needs of the District would be more completely satisfied nor more effectively met by an organizational model other than the one currently employed.

FACULTY ASSIGNMENT FLEXIBILITY

This project was to define the various types of teaching activities now exercised by faculty members and was to develop a new policy of faculty assignment taking into account the activities so defined. The FUSE group spent much of the 1970 Easter vacation on this project. Sam Peterson has offered a proposed model for development of faculty loads that satisfies the doctrine of "whatever is fair." We have copies of interesting memoranda exchanged between Sam and Jack Jensen who proposed the use of para-professionals as an integral part of faculty assignment flexibility.

Policy statements were requested of the District faculty regarding a new work load statement for inclusion in the Board Rules and Regulations. Statements were received from five faculty members and from the Orange Coast College Technology and English Divisions. Although asked for a draft policy statement, most confined themselves to explaining how the teaching loads in their divisions should be adjusted.

EXPANSION OF INSTRUCTIONAL TELEVISION

A program of information dissemination was to be developed for the purpose of acquainting instructors with television as a tool of instruction. Position papers were prepared by Golden West and Orange Coast Colleges describing their plans for television in the future. The Vice Chancellor for Educational Development prepared a preliminary report of telecommunications in the District. This report observed that major tele-communications facilities have been constructed at Golden West College and that that College would be using closed-circuit television by Fall, 1970.

During the academic year 1970-71 the District has served as a member of the regional Consortium for Community College Broadcast Television. This Fall, a Psychology 1A course was offered under the auspices of the consortium. Similar programs are foreseen for the immediate future.

In addition, the District has applied for an FCC license to operate Channel 50 and has also applied for a grant from the Department of Health, Education, and Welfare to finance equipment needed for the broadcasting of television program material.

TAKE EDUCATION TO THE STUDENT

Special divisions of instruction were to be established on each college campus for the purpose of developing and operating special educational programs serving those typically not now served by the District. At the present time, Golden West College is operating something known as "Miller's Delight." No changes in divisional structure are anticipated at Golden West as a result of this effort. Both Orange Coast and Golden West have outfitted trucks and trailers used to take information about the colleges out to the community and to conduct special off-campus educational programs.

EIGHTEEN WEEK SYNDROME

This project would identify courses that could be effectively taught and/or subdivided into short-term learning experiences and would find faculty members willing to design and implement them. At the present time, Orange Coast College has instituted a number of short-term courses.

SPECIALIZATION IN MULTI-SECTIONS COURSES

A plan was to be contrived to utilize and specialize upon individual teacher talents in multi-section courses. Organizational meetings for such things were held at both colleges. As this writer understands it, no one attended the one held at Golden West College. Seventeen faculty members attended the one at Orange Coast College and that group was to have prepared a number of proposals. Two were delivered to the Office of Educational Development.

UTILIZATION OF PARA-PROFESSIONALS

Detailed plans and models to conduct pilot programs in the utilization of para-professionals were to be developed. Although specific pilot programs have not been developed, district use of para-professional course assistants has increased substantially in the year 1969-70 to 1970-71.

PREVIOUS EXPERIENCE COURSE CREDIT

A challenge center was to be designed and implemented for students who wish to demonstrate that they have satisfied course requirements as a result of previous educational experiences. If successful in their challenge, the student would be awarded college credit as appropriate. The Office of

Educational Development received a memorandum from the Golden West College Dean of Instruction indicating that the Golden West College Catalog for 1970-71 will contain statements concerning new programs which will enable students to earn college credit for off-campus work experience.

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