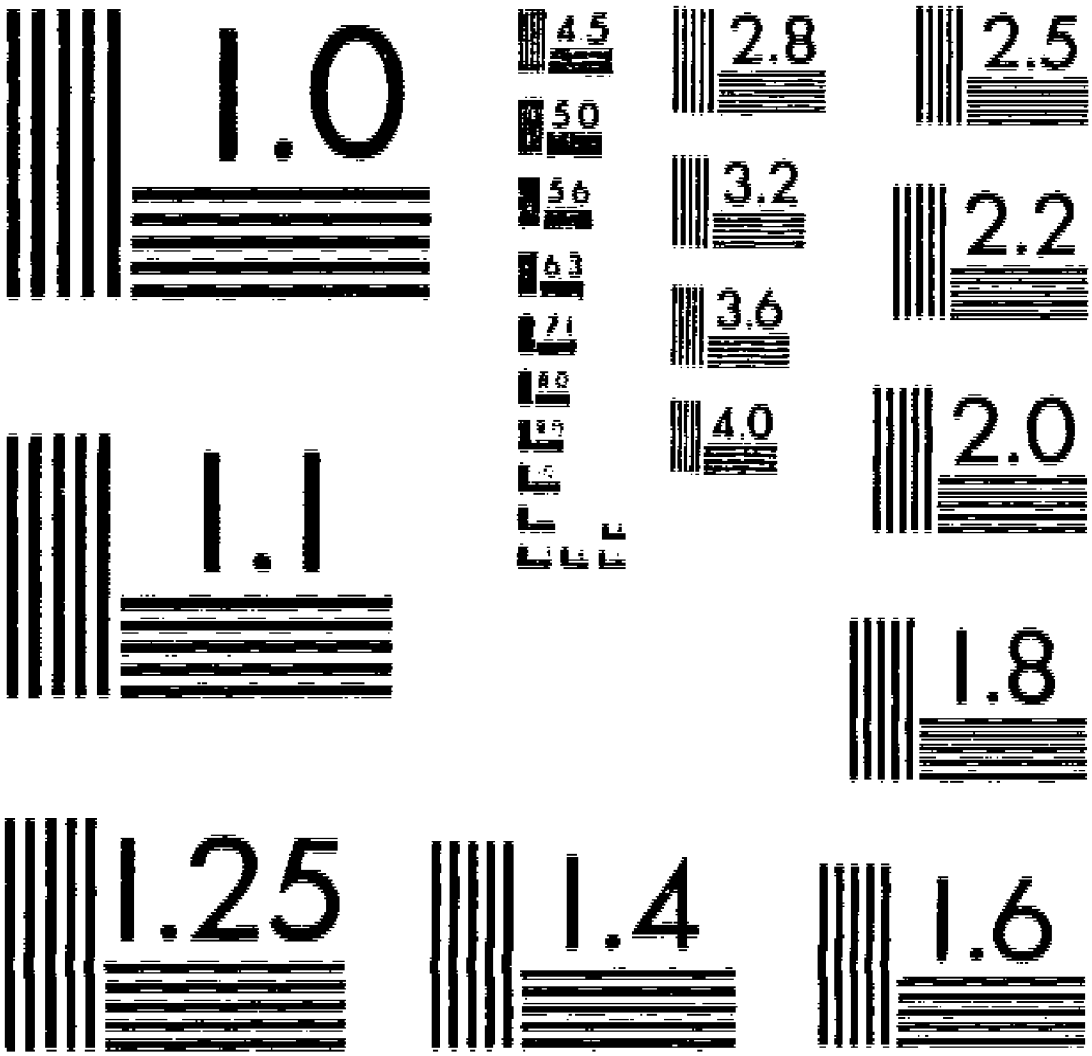


DOCUMENT RESUME

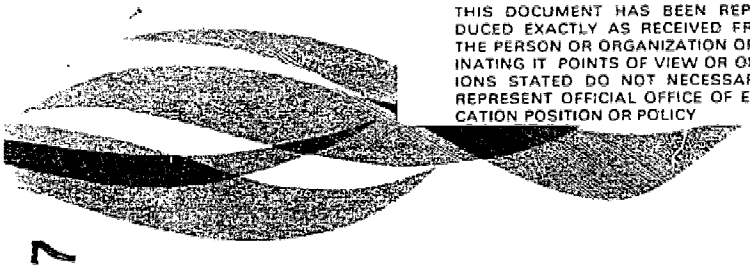
ED 060 847 JC 720 091

AUTHOR Brightman, Richard W.
TITLE Coast's Practitioners Review Computer Assisted Instruction.
INSTITUTION Coast Community Coll. District, Costa Mesa, Calif.
PUB DATE May 72
NOTE 31p.

EDRS PRICE MF-$0.65 HC-$3.29
DESCRIPTORS *Computer Assisted Instruction; *Cost Effectiveness; Educational Technology; Instructional Media; *Instructional Technology; *Junior Colleges; Programed Instruction; *Teacher Attitudes

ABSTRACT

A review of the literature concerning computer assisted instruction (CAI) yielded 23 assertions of the value of CAI as an instructional technique. Sixty-seven faculty members in two community colleges who have had opportunities to use CAI were surveyed as to their agreement or disagreement with each assertion. The faculty responses showed widespread agreement with all 23 assertions with a few differences of opinion appearing between faculty members teaching technical and those teaching non-technical subjects. Comments made by the respondents suggest a need for data file access for CAI purposes and that alternative instructional systems may be more effective than CAI in realizing some of the assertions. The author recommends that considerably more research is needed to compare the relative costs of CAI and to assess whether or not its increased effectiveness, if any, is justified. (Author/LP)



Coast Community College district

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COAST'S PRACTITIONERS REVIEW

COMPUTER ASSISTED INSTRUCTION

Richard W. Brightman
Office of Educational Development
May, 1972

ABSTRACT

A review of literature concerning computer assisted instruction (CAI) yielded 23 assertions of the value of CAI as an instructional technique. In an effort to draw upon the opinion of 67 college faculty members who have had direct experience in making use of CAI, their opinions as to agreement or disagreement with each assertion have been studied.

The faculty members showed widespread agreement with all 23 assertions with few differences of opinion appearing as between faculty members teaching technical and those teaching non-technical subjects. Comments made by the respondents suggest a need for data file access for CAI purposes and that alternative instructional systems may be more effective than CAI in terms of realizing some of the assertions.

In the past few years computer assisted instruction (CAI) has set a number of educators all a-twitter. I use this metaphor advisedly. I envision a tree full of birds. They view one of their fellows on the ground below being eaten by a cat. Their collective twitterings makes a fearsome noise but few do much to help.

So it has been with CAI. Those most a-twitter speak of CAI in terms that can only be described as euphoric.

> Almost all the teacher will have to do is to arrange a computer program which can deal with all the natural questions and natural troubles of the student. The program should respond sensibly to each of the student's needs or wants as it is expressed. For a few years a computer will usually need letters or digits typed on a keyboard--but later on the computer will respond to letters or digits spoken (Berkeley, p. 6).

Not all are *that* enthusiastic about CAI although it is almost impossible to find references in the literature to it that are other than gushing in their praise for this new instructional technique.

After attending innumerable conferences and having casual conversations with many educators about CAI, I suspect that many of it's staunchest advocates have never written a CAI program. Nor, judging from what they say, have they

spent much time in talking with those who have or with students who have tried to learn something from such programs. With few exceptions, CAI literature has been contributed by educational administrators, bureaucrats, and computer types who are at least one step removed from where the action is; that is, where learning takes place. This paper reports a study that tries to take into account the views of faculty members who have been directly involved in preparing and using CAI materials.

Evaluating CAI

As with almost all other instructional media, computer assisted instruction has not often been rigorously evaluated as an instructional technique. Some efforts, however, are notable, particularly those undertaken by Patrick Suppes of Stanford University and his experimentation with the Brentwood School in East Palo Alto, California. Suppes found some evidence that first graders receiving reading instructions via CAI performed significantly better on a reading test than did those who did not (Atkinson and Wilson, p. 161).

More recently, a number of projects have been launched to evaluate computer assisted instruction. Carl L. Zinn at the Center for Research on Learning and Teaching at the University of Michigan at Ann Arbor for example, has been working on a "Critical Evaluation of current Technology, Applications, Costs, Effectiveness and Trends" of CAI under the sponsorship of the U.S. Office of Education (Data Processing for Education, Vol. 8, p. 6). Roger Levien of the Rand Corporation in Santa Monica, California, is conducting a study of the instructional uses of computers in higher education under a one-year contract with the Carnegie Commission on the Future of Higher Education (Data Processing for Education, Vol. 8, p. 9). To our knowledge, the final reports of these studies have not been produced. However, we understand that they will report

on the present possible uses of computers in teaching and learning and will provide a review of the current status and prospective developments in computer technology in instruction.

Generally, in the literature today, reports of imminent success are more frequent than those of past successes and reports of evaluations to take place are more prevelent than those of evaluations that have been completed. A CAI program devised for some 2,000 Appalachian area elementary and high school students was reported in the June/July, 1971, issue of Automated Education Letter. This system employes 34 teletypewriter computer terminals located in 26 semi-rural and rural public and parochial schools. In addition to the commonplace if extravagent, claims for the promised effectiveness of this system, the director of the program had nothing more than this to say about its evaluation:

> The ability of the computer to be used as a tool in curriculum development and the flexibility to permit a classroom teacher to offer her own instructional programming opened such tremendous possibilities that we seem to be limited simply by our willingness and imagination (Automated Education Letter, p. 8).

Probably because computer systems are expensive, CAI gives rise to apprehension about high costs of instruction. As a result, some evaluations of CAI have concentrated exclusively on this aspect. Unfortunately, there has not been much definitive work resulting from this effort. The costs that have been reported range from twelve cents per student contact hour (Rand Corporation, p. 33) to $7.00 per student contact hour (Data Processing for Education, Vol. 7, p. 12) and on up. Usually ignored in such cost calculations are the costs of the necessary software, the computer programs that do the teaching. It has been estimated by visitors to the Coast Community College District that the amount of time required to prepare a CAI segment ranges from five to 500 hours of preparation work per hour of student learning activity. Costs of computer assisted

instruction are probably irrelevent anyway, at least until we have some measure of the relative effectiveness of the new instructional technique. As one author puts it,

> Attempts at a general evaluation of computer assisted instruction in terms of costs and effectiveness are premature in two respects. The costs...are unrealistic in even a short term sense. Hardware manufacturers are only beginning the transition from development to production. As the transition continues over the immediate future, the per unit costs will be reduced accordingly. Second, measurements of effectiveness are difficult to achieve given the current lack of a sound theoretical basis for describing levels of learning and achievement. What is needed is a definition of some standard unit, some "erg" of learning and forgetting (Atkinson and Richardson, p. 10).

That leaves us, I'm afraid, with our feet firmly planted in mid-air. We suspect that computer assisted instruction is costly, yet costs are only relevent in terms of the relative effectiveness of the instruction system employed. To date not one has really grappled with the total question of evaluating CAI in these terms.

At the Coast Community College District some efforts have been devoted to evaluating the effectiveness of computer assisted instruction. One of these efforts drew upon student opinion after they undertook to learn something using CAI. As the teacher doing the work put it,

> It is too soon to tell, we don't have enough numbers. Only about 175 students have been through the (English) programs this year. I have no statistics to show that they write any better as a result. In fact, I have no measure yet of whether they write better as a result of the experience on the computer. Of course I could compare students in one class who are using the computer to one in which they are not. I tried to persuade (another faculty member) to bring only one of her classes to the computer. She declined graciously. (Thames)

Although reporting that student reactions to CAI were not altogether unfavorable, that Golden West College faculty member was left "amazed and discouraged" after her extensive experience with it (Thames).

On a couple of occasions the Coast Community College District has attempted analysis of the relative efficacy of computer assisted instruction as compared with a reasonable alternative instructional strategy. One of these involved the Law Enforcement program at Golden West College. CAI segments were prepared, students undertook to learn about certain law enforcement matters from the segments and then were tested with an examination validated with some effort by the Los Angeles Police Academy. Performance on the examination on the part of Golden West College police cadets was compared with performance on the same examination taken by cadets at the Los Angeles Police Academy. Contrary to what has been reported by others about this project, we did *not* find computer assisted instruction to be more effective in teaching these matters than was the conventional instructional program at the Los Angeles Police Academy. We did find, we think, that the total instructional environment at the Golden West Police Academy was instrumental in causing or permitting the Golden West College cadets to perform better on the examination. We were not able to isolate CAI as a direct cause of that performance differential (Brightman, December, 1970).

On another occasion we evaluated the relative effectiveness with which students were able to perform on an examination measuring certain concepts taught in a course entitled "Computer Operations." A portion of the students enrolled in the course studied certain material using computer assisted instruction segments. The remainder of the class studied it using conventional instruction techniques, namely lecture and demonstration. In this project we found no significant difference in performance levels between the two groups of students on the written examination although those students learning the materials using the CAI system seem to perform better and more effectively in the computer laboratory with actual computer equipment than did the conventional group (Brightman, October, 1970).

About This Study

In the absence of thorough and definitive efforts to evaluate the relative effectiveness of computer assisted instruction, whatever its costs, most educators content themselves with repeating the same sort of glowing predictions that have characterized discussions of CAI since the notion got its start. As has been pointed out earlier, few of CAI's soothsayers have front-line experience in the use of the instructional system. This paper reports an effort to draw upon the knowledge of a number of college teachers who have involved themselves with making use of computer assisted instruction in the course of their teaching activities. We make no pretense that what has been learned from these teachers is at all definitive in terms of an evaluation of CAI. We have, however, drawn upon the opinions of faculty members with front-line experience making use of it. Because of this experience, their viewpoint is probably worth considering.

What we have done is this: First, we reviewed as much of the literature on computer assisted instruction as was reasonably available to us. Our purpose in reviewing it was to identify those assertions made for CAI by its many and vociferous advocates. We made no attempt at a thorough review of the literature, although I would guess that we have examined a good portion of the published and unpublished material available to anyone. The results of this examination yielded 23 positive assertions about computer assisted instruction. Each of these 23 assertions appears in Figure I.

Next, we identified those faculty members at the Coast Community College District who were active in computer assisted instruction activities. In order to qualify as an "active" CAI faculty member, the teacher must have accumulated a total of ten hours of connect time with the Coast Community College District

computer facility. At Coast, computer assisted instruction is implemented making use of the APL programming language which is distributed to each of the two colleges through 70 typewriter terminals. Each instructor wishing to make use of the system for instructional purposes is assigned a user number. In order to identify those faculty members who had accumulated at least ten hours of time, records which show the amount of time accumulated for each user number were examined. Seventy seven members out of 407 full-time certificated instructional staff in the District qualified.

Each of these 77 faculty members was sent the Instructional Media Survey form shown in Figure I. They were asked to indicate the degree to which they agreed with the various assertions shown on the form and to identify the subject area in which they felt the most qualified to judge computer assisted instruction.

Results

Seventy five of the 77 faculty members returned the survey form, a response rate indicative, perhaps, of the interest that these faculty members had in the subject matter. Two faculty members sent back multiple forms as they felt qualified to judge the assertions in terms of more than one subject area. Twelve faculty members disqualified themselves, even though returning the questionnaire. A total of 70 questionnaires were returned, 67 of which were usable for the purposes of this study. Figure I also shows the response frequencies and percentages for each of the 23 assertions on the survey form.

In an effort to evaluate the notion that computer assisted instruction is more appropriate for mathematics and technical areas than for other areas of college study, we separated the faculty returns into two groups: a group of returns from those faculty members using CAI for technical subjects and another

group of returns from those faculty members using it for non-technical subjects. The distinction of a technical subject from a non-technical subject was essentially arbitrary in nature. Those subjects viewed as technical include: aeronautics, chemistry, graphic arts technology, logic, mathematics, physics, psychology and technology. All those considered as non-technical include: accounting, biology, business, business data processing, business information systems, communications and English, data processing, economics, English, foreign language, history, humanities, law enforcement, marketing, music, nursing, physical education, political science, and secretarial training.

Considering the various subject areas reported by the respondents, mathematics had the highest frequency with 20 faculty members reporting that as the subject area they felt most qualified to assess the assertions made for computer assisted instruction. Chemistry with five respondents and business information systems and English with four each were next in line. Physics, business and biology each had three respondents. Psychology, political science, physical education and data processing each had two. There was one respondent each reporting the following subjects: technology, secretarial training, nursing, music, marketing, logic, law enforcement, humanities, history, graphic arts technology, foreign language, economics, communications and English, business data processing, aeronautics and accounting. Figure II shows the response frequencies and percentages for those subject areas identified as technical in nature.

In addition, the 23 assertions were categorized into four basic groups: those assertions that were oriented towards improving student learning, those oriented towards drill and practice exercises, those toward simulation and

problem solving, and those assertions pertaining to use of the computer system for the management of instruction. Figure III shows the four categories and those assertions that pertain to each.

Figure IV shows the response frequencies for those assertions related to the category "improved student learning." These response frequencies were provided by the total response group. Figures V and VI show the same response frequencies from the non-technical group of respondents and the technical group of respondents respectively.

Figures VII, VIII and IX show the response frequencies for those items associated with "drill and practice." Figure VII shows the responses for the total group. Figures VIII and IX show, respectively, the responses for the non-technical group and the technical group. Figures X, XI, and XII show the same sort of responses for the total response group, the non-technical group, and the technical group for "simulation and problem-solving." Figures XIII, XIV, and XV show the responses for the total, technical, and non-technical groups for those items associated with "instructional management."

In an effort to answer the question "Do those instructors in technical areas view CAI as more appropriate for their use than instructors in non-technical areas?" chi-square analysis was run on each of the 23 assertions to determine if a significant difference in response frequencies for any assertion could be found. In order to do that, the responses for each item had to be grouped. Responses for Agree Strongly and Agree were grouped together as were responses for Disagree and Disagree Strongly. Those responses in the No Opinion column were not considered in this analysis. Grouping of responses was necessary in order to have sufficient frequencies in each chi-square matrix cell to justify analysis. Even so, on a number of items the responses in the Disagree/Disagree Strongly cell were insufficient.

Only four assertions, 7, 9, 13, and 19 yielded chi-square scores indicating that response frequencies were significantly different at the five percent level of confidence or better. These are shown in Figure XVI.

On the Instructional Media Survey Form, room was allowed for respondents to comment on each of the 23 assertions. Those comments that were offered by responding faculty members were read and six categories of response types were formulated. These six categories include the following:

1. Need files for this
2. Is useful but other techniques are more effective
3. Too expensive
4. Computer availability critical
5. Useful with microfiche
6. Requires a lot of development time

The comments were then reread and categorized into one of the six categories above. Figure XVII shows the numbers of times each comment was made for each assertion.

Discussion

By and large, this writer feels uncomfortable in applying objective statistical analysis to data that are entirely subjective in nature. This is the case with the data returned by the faculty members participating in this study. Viewed as a whole, the responses are certainly positive with respect to all 23 assertions. The vast majority of those faculty members who have been active in computer assisted instruction activities at Coast agree with all of the assertions. Viewing the No Opinion response column in Figure I as an index of the degree to which faculty members feel qualified to judge each assertion, only a handful of assertions show up as the sort which faculty

members do not feel so qualified. These include those shown in Figure XVIII. To qualify for inclusion on this list, an assertion must have attracted at least 30 percent of its responses in the No Opinion column.

Combining the Disagree and Disagree Strongly response percentages, and rather arbitrarily picking a cut-off level of 15 percent for this total, yields a list of assertions for which there is at least some disagreement. This list appears in Figure XIX. Assertion 16, "Is useful in administering examinations" appears in the lists shown in both Figures XVIII and XIX. Thus, it would appear that not only do a fairly substantial proportion (23.9 percent) of the respondents disagree or disagree strongly with this assertion but a fairly large proportion (31.3 percent) have no opinion. Only 44.8 percent of the respondents agree or agree strongly with this assertion.

Assertion 22, "Provides a source of bibliographic references on matters of interest selected by students" also had a fairly high frequency of responses indicating no opinion: 50 percent. Only 37.9 percent of the respondents indicated agreement with this assertion. Item 10 "Is useful in controlling other instructional media such as slide projectors and tape playback units" also had a lower response frequency in the agree and agree strongly columns than did most of the other assertions, primarily because of the relatively high proportion of faculty members who had no opinion.

As for comparing the response frequencies on each assertion among those faculty members who indicated technical subject areas as opposed to non-technical areas, only four assertions emerged as being viewed differently. These are shown in Figure XVI. Judging from the responses, the technical group feels that computer assisted instruction is less useful in conveying facts, in defining terms, in reducing the amount of time spent in the classroom for

routine drill, and is more useful for classroom demonstration purposes than do the non-technical group. The significant chi-square scores shown in Figure XVI indicate that the differences in response frequencies between the technical and non-technical groups for each of the four assertions probably did not come about by chance. This does not say that the differences are necessarily meaningful.

Figure XVII shows for each of the 23 assertions the number of times one or more of six comments were made by faculty members using the space for that purpose provided in the questionnaire. The comment that "files were necessary for best use" appeared more often than any other. As CAI now works at Coast, there is no means to permanently store any record of students' progress at the computer terminal or to access other information that might be useful in controlling the computer programs providing the instructional sequences. This ability, judging from the comments made by faculty members, would be particularly useful in order to provide individualized student diagnosis in prescription (assertion 4) and for providing teachers with information about individual student progress (assertion 7). The comment "need files for this" was made for ten of the 23 assertions.

The comment "is useful but other techniques may be more effective" occurred somewhat less frequently than did the one pertaining to the need for files. Twelve of the 23 assertions carried this comment from at least one faculty member.

Other comments were more scattered than the ones dealing with file necessity or other techniques being more effective than CAI. Three faculty members felt that with respect to some assertions CAI was too expensive. Seven saw computer availability as critical for the successful realization of the assertion. Two indicated that the use of computer-controlled microfiche devices would be

helpful with respect to the assertion and two more suggested that realization of the assertion would require a lot of developmental time.

Because of concern about the relative cost-effectiveness of CAI and alternative instructional methods, some discussion of evaluating CAI should pay attention to this interesting, if perplexing, topic. Any comparison of instructional effectiveness of CAI should also take into account comparative costs, if at all possible. This is so because of the anxiety felt by many educators over the costliness of computer assisted instruction and because of the current emphasis on instructional costs being placed on both educators and governmental agencies. Costs are difficult to evaluate for an instructional system that uses only part of an elaborate computing facility. The Coast Community College District Information Services facility reports that of the $693,696 per year currently being spent by the District for computing hardware devices, about $372,704 can be allocated to APL services. Almost all APL activity at Coast is involved with computer assisted instruction. Three hundred seventy-two thousand seven hundred four dollars will hire about 31 full-time faculty members at an average salary of $12,000 per year. For the Spring Semester, 1971-72, 378 each full-time equivalent instructor in the District provided about 558 student contact hours per week. Thirty-one instructors, then, could provide roughly 17,298 student contact hours of instruction provided that physical facilities and other necessities were also made available, as, of course, they would have to be for computer assisted instruction, too. The question, then, is whether or not the computer assisted instruction system provided by Coast's expenditure of $372,700 per year is capable of offering that much instruction, and, even more importantly, whether or not that instruction would be as effective as the conventional sort of instruction provided by 31 faculty members.

In order to provide as many instructional hours, the 70 CAI terminals maintained by Coast's computer system would have to each offer 247 contact hours of instruction per week. Clearly, this is out of the question. However, these rough calculations do not take into account, as was noted, the physical facilities and other things needed for 31 faculty members to operate effectively, or, for that matter, to operate at all. Assuming that one were to split the $372,700 now spent for CAI into two parts, one half for faculty salaries and one half for support activities and facilities, the 15 new faculty members would offer only half as many weekly contact hours of instruction as the 31. The 70 CAI terminals would now be expected to provide only 123 hours or so of instruction per week each. Still, this is out of the question.

Conclusions

It's doubtful that very much could or should be concluded from the data discussed in this paper. Faculty members clearly like working with computer assisted instruction. Most of them agree with most of the assertions that have been made in the literature concerning this new instructional technique. Informal reports we have heard indicate that students also enjoy working with computer assisted instruction. There is no particularly strong nor necessarily meaningful difference in the degree to which our respondents agreed or disagreed with the various assertions when considering the technical or non-technical nature of the subject matter about which the respondents felt most capable of judging CAI.

Those comments made by faculty members indicate that the need for files and the possibility that other instructional techniques might be more effective suggests that Coast should experiment with the use of data files with its computer assisted instruction system. Also, additional research in the form of

more rigorous comparison of the relative effectiveness of CAI with reasonable alternative instructional techniques is called for.

Before one gets too excited about the discussion of CAI costs, one should remember that the purpose in bringing it up is to illustrate the necessity not only of comparing relative effectiveness of computer assisted instruction, but also of considering its relative costs. It may be that computer assisted instruction, as a more effective instructional technique, is worth the additional cost presently required to make use of it. Moreover, in the future, hopefully, the costs per hour of instruction of CAI will reduce. At least, this is what is predicted by computer experts. If this kind of costs effectiveness evaluation is appropriate for computer assisted instruction, many argue, then surely it should be appropriate for all other kinds of instructional systems too, including auto-tutorial systems, large group instruction, and conventional instruction employing one teacher administering to 30 or 40 students. This is a correct view, of course. However, the monetary risks involved with those other systems do not approach those involved with computer assisted instruction, at least at today's computer prices. For this reason, cost effectiveness evaluation of computer assisted instruction is more critical than it is for those other instructional systems.

Recommendations

The preceding discussion has suggested a number of recommendations. These are listed here.

1. The District should acquire data file access capability for its CAI system so that this capability can be assessed in terms of its importance, particularly for those assertions for which the faculty members have called for files.

2. Considerable additional research is required to assess the relative effectiveness of computer assisted instruction as compared with other instructional systems.
3. Considerable more research should be conducted to compare the relative costs of computer assisted instruction and to assess whether or not the increased effectiveness, if any, of this instructional system justifies the increased costs that seem to obtain at the current time for computer assisted instruction.

COAST COMMUNITY COLLEGE DISTRICT

Instructional Media Survey
Computer Assisted Instruction

INSTRUCTIONS: This survey asks you to indicate the degree to which you agree with a number of assertions made about computer assisted instruction (CAI) based upon your experience in your subject area. Please write the subject area in which you have done the most CAI work or about which you feel most confident to judge CAI. Then check your level of agreement for each assertion as you see it in terms of your subject area. Return the survey form to Rich Brightman in the District Office.

YOUR SUBJECT AREA IS: _____

COMPUTER-ASSISTED INSTRUCTION:		Agree Strongly	Agree	No Opinion	Disagree	Disagree Strongly	Comments
1. improves opportunites for students to learn individually	%	61.2	29.9	7.5	0	1.5	
	F	41	20	5	-	1	
2. is useful for drill and practice exercises	%	61.2	29.9	6.0	3.0	0	
	F	41	20	4	2	-	
3. provides tutorial instruction involving student-computer "dialogue."	%	28.8	51.5	9.1	9.1	1.5	
	F	19	34	6	6	1	
4. provides individualized student diagnosis and prescription based on past student experience and performance.	%	19.7	34.8	31.8	10.6	3.0	
	F	13	23	21	7	2	
5. provides students with a problem-solving tool.	%	48.5	34.8	13.6	1.5	1.5	
	F	32	23	9	1	1	
6. is useful in simulating phenomena and events.	%	38.8	35.8	19.4	4.5	1.5	
	F	26	24	13	3	1	
7. is useful in conveying facts.	%	33.3	36.4	13.6	12.1	4.5	
	F	22	24	9	8	3	
8. is useful in explaining concepts.	%	25.4	34.3	22.4	11.9	6.0	
	F	17	23	15	8	4	
9. is useful in defining terms.	%	25.4	38.8	17.9	11.9	6.0	
	F	17	26	12	8	4	
10. is useful in controlling other instructional media such as slide projectors and tape playback units.	%	22.7	31.8	36.4	7.6	1.5	
	F	15	21	24	5	1	
11. is useful in directing students to various learning experiences other than and including the computer.	%	25.8	33.3	30.3	7.6	3.0	
	F	17	22	20	5	2	

Continued on reverse side

Figure I
Responses From The Total Group

COMPUTER-ASSISTED INSTRUCTION:		Agree Strongly	Agree	No Opinion	Disagree	Disagree Strongly	Comments
12. increases the amount of time instructors can spend with students individually.	%	33.3	31.8	13.6	18.2	3.0	
	F	22	21	9	12	2	
13. reduces the amount of time spent in the classroom for routine drill or example presentation.	%	49.3	35.8	6.0	7.5	1.5	
	F	33	24	4	5	1	
14. makes student learning more systematic and planned.	%	18.2	39.4	24.2	16.7	1.5	
	F	12	26	16	11	1	
15. is useful in controlling the sequence and the pace of learning experiences.	%	25.4	38.8	17.9	11.9	6.0	
	F	17	26	12	8	4	
16. is useful in administering examinations.	%	16.4	28.4	31.3	16.4	7.5	
	F	11	19	21	11	5	
17. provides teachers with information about individual student progress.	%	24.2	40.9	15.2	9.1	10.6	
	F	16	27	10	6	7	
18. helps students to develop skills in problem-solving and algorithm design.	%	31.3	37.3	28.4	3.0	0	
	F	21	25	19	2	-	
19. is useful for classroom demonstration purposes for groups of students.	%	21.2	37.9	21.2	13.6	6.1	
	F	14	25	14	9	4	
20. permits students to work with realistic problems which, without the computers unique capabilities, would be otherwise impractical.	%	56.1	27.3	12.1	4.5	0	
	F	37	18	8	3	-	
21. provides data bases permitting student to access information needed to exercise their abilities at data analysis and synthesis.	%	33.3	33.3	27.3	6.1	0	
	F	22	22	18	4	-	
22. provides a source of bibilographic references on matters of interest selected by students.	%	9.1	28.8	50.0	10.6	1.5	
	F	6	19	33	7	1	
23. reduces time spent by students in the drudgery of problem-solving thus freeing time for thought and insight.	%	35.8	25.4	23.9	10.4	4.5	
	F	24	17	16	7	3	

Figure I (Continued)

COAST COMMUNITY COLLEGE DISTRICT

Instructional Media Survey
Computer Assisted Instruction

INSTRUCTIONS: This survey asks you to indicate the degree to which you agree with a number of assertions made about computer assisted instruction (CAI) based upon your experience in your subject area. Please write the subject area in which you have done the most CAI work or about which you feel most confident to judge CAI. Then check your level of agreement for each assertion as you see it in terms of your subject area. Return the survey form to Rich Brightman in the District Office.

YOUR SUBJECT AREA IS: _____

COMPUTER-ASSISTED INSTRUCTION:		Agree Strongly	Agree	No Opinion	Disagree	Disagree Strongly	Comments
1. improves opportunities for students to learn individually.	%	61.8	29.4	5.9	0	2.9	
	F	21	10	2	-	1	
2. is useful for drill and practice exercises.	%	70.6	17.6	5.9	5.9	0	
	F	24	6	2	2	-	
3. provides tutorial instruction involving student-computer "dialogue."	%	35.3	50.0	2.9	8.8	2.9	
	F	12	17	1	3	1	
4. provides individualized student diagnosis and prescription based on past student experience and performance.	%	20.6	44.1	14.7	17.6	2.9	
	F	7	15	5	6	1	
5. provides students with a problem-solving tool.	%	70.6	11.8	14.7	2.9	0	
	F	24	4	5	1	-	
6. is useful in simulating phenomena and events.	%	41.2	41.2	14.7	2.9	0	
	F	14	14	5	1	-	
7. is useful in conveying facts.	%	23.5	35.3	11.8	20.6	8.8	
	F	8	12	4	7	3	
8. is useful in explaining concepts.	%	17.6	32.4	26.5	17.6	5.9	
	F	6	11	9	6	2	
9. is useful in defining terms.	%	17.6	38.2	11.8	20.6	11.8	
	F	6	13	4	7	4	
10. is useful in controlling other instructional media such as slide projectors and tape playback units.	%	23.5	35.3	29.4	11.8	0	
	F	8	12	10	4	-	
11. is useful in directing students to various learning experiences other than and including the computer.	%	21.2	39.4	27.3	6.1	6.1	
	F	7	13	10	2	2	

Continued on reverse side

Figure II
Responses From The "Technical" Group

COMPUTER-ASSISTED INSTRUCTION:

		Agree Strongly	Agree	No Opinion	Disagree	Disagree Strongly	Comments
12. increases the amount of time instructors can spend with students individually.	%	23.5	32.4	20.6	20.6	2.9	
	F	8	11	7	7	1	
13. reduces the amount of time spent in the classroom for routine drill or example presentation.	%	41.2	35.3	8.8	11.8	2.9	
	F	14	12	3	4	1	
14. makes student learning more systematic and planned.	%	14.7	32.4	23.5	29.4	0	
	F	5	11	8	10	-	
15. is useful in controlling the sequence and the pace of learning experiences.	%	23.5	38.2	14.7	17.6	5.9	
	F	8	13	5	6	2	
16. is useful in administering examinations.	%	8.8	29.4	32.4	23.5	5.9	
	F	3	10	11	8	2	
17. provides teachers with information about individual student progress.	%	32.4	35.3	14.7	8.8	8.8	
	F	11	12	5	3	3	
18. helps students to develop skills in problem-solving and algorithm design.	%	47.1	38.2	11.8	2.9	0	
	F	16	13	4	1	-	
19. is useful for classroom demonstration purposes for groups of students.	%	29.4	44.1	14.7	5.9	5.9	
	F	10	15	5	2	2	
20. permits students to work with realistic problems which, without the computers unique capabilities, would be otherwise impractical.	%	70.6	26.5	2.9	0	0	
	F	24	9	1	-	-	
21. provides data bases permitting students to access information needed to exercise their abilities at data analysis and synthesis.	%	38.2	32.4	26.5	2.9	0	
	F	13	11	9	1	-	
22. provides a source of bibliographic references on matters of interest selected by students.	%	6.1	30.3	45.5	15.2	3.0	
	F	2	10	16	5	1	
23. reduces time spent by students in the drudgery of problem-solving thus freeing time for thought and insight.	%	41.2	23.5	23.5	5.9	5.9	
	F	14	8	8	2	2	

Figure II (Continued)

IMPROVES STUDENT LEARNING

Number	Assertion
1	Improves opportunities for students to learn individually.
12	Increases the amount of time instructors can spend with students individually.
13	Reduces the amount of time spent in the classroom for routine drill or example presentation.
14	Makes student learning more systematic and planned.
19	Is useful for classroom demonstration purposes for groups of students.
23	Reduces time spent by students in the drudgery of problem-solving thus freeing time for thought and insight.

DRILL AND PRACTICE

2	Is useful for drill and practice exercises.
3	Provides tutorial instruction involving student-computer "dialogue."
7	Is useful in conveying facts.
8	Is useful in explaining concepts.
9	Is useful in defining terms.

SIMULATION AND PROBLEM-SOLVING

5	Provides students with a problem-solving tool.
6	Is useful in simulating phenomena and events.
18	Helps students to develop skills in problem-solving and algorithm design.
20	Permits students to work with realistic problems which, without the computer's unique capabilities, would be otherwise impractical.
21	Provides data bases permitting students to access information needed to exercise their abilities at data analysis and synthesis.

INSTRUCTIONAL MANAGEMENT

4	Provides individualized student diagnosis and prescription based on past student experience and performance.
10	Is useful in controlling other instructional media such as slide projectors and tape playback units.
11	Is useful in directing students to various learning experiences other than and including the computer.
15	Is useful in controlling the sequence and the pace of learning experiences.
16	Is useful in administering examinations.
17	Provides teachers with information about individual student progress.
22	Provides a source of bibliographic references on matters of interest selected by students.

Figure III
Categories Of Assertions

IMPROVES STUDENT LEARNING

Assertion	Agree Strongly	Agree	No Opinion	Disagree	Disagree Strongly
1	41	20	5	0	1
12	22	21	9	12	2
13	33	24	4	5	1
14	12	26	16	11	1
19	14	25	14	9	4
23	24	17	16	7	3
TOTAL	146	133	64	44	12

Figure IV
Improves Student Learning:
Total Response Group

Assertion	Agree Strongly	Agree	No Opinion	Disagree	Disagree Strongly
1	20	10	3	0	0
12	14	10	2	5	1
13	19	12	1	1	0
14	7	15	8	1	1
19	4	10	9	7	2
23	10	9	8	5	1
TOTAL	74	66	31	19	5

Figure V
Improves Student Learning:
Non-Technical Group

Assertion	Agree Strongly	Agree	No Opinion	Disagree	Disagree Strongly
1	21	10	2	0	1
12	8	11	7	7	1
13	14	12	3	4	1
14	5	11	8	10	0
19	10	15	5	2	2
23	14	8	8	2	2
TOTAL	72	67	33	25	7

Figure VI
Improves Student Learning:
Technical Group

DRILL AND PRACTICE

Assertion	Agree Strongly	Agree	No Opinion	Disagree	Disagree Strongly
2	41	20	4	2	0
3	19	34	6	6	1
7	22	24	9	8	3
8	17	23	15	8	4
9	17	26	12	8	4
TOTAL	116	127	46	32	12

Figure VII
Drill and Practice:
Total Response Group

Assertion	Agree Strongly	Agree	No Opinion	Disagree	Disagree Strongly
2	17	14	2	0	0
3	7	17	5	3	0
7	14	12	5	1	0
8	11	12	6	2	2
9	11	13	8	1	0
TOTAL	60	68	26	7	2

Figure VIII
Drill and Practice:
Non-Technical Group

Assertion	Agree Strongly	Agree	No Opinion	Disagree	Disagree Strongly
2	24	6	2	2	0
3	12	17	1	3	1
7	8	12	4	7	3
8	6	11	9	6	2
9	6	13	4	7	4
TOTAL	56	59	20	25	10

Figure IX
Drill and Practice:
Technical Group

SIMULATION AND PROBLEM-SOLVING

Assertion	Agree Strongly	Agree	No Opinion	Disagree	Disagree Strongly
5	32	23	9	1	1
6	26	24	13	3	1
18	21	25	19	2	0
20	37	18	8	3	0
21	22	22	18	4	0
TOTAL	138	112	67	13	2

Figure X
Simulation and Problem Solving:
Total Response Group

Assertion	Agree Strongly	Agree	No Opinion	Disagree	Disagree Strongly
5	24	4	5	1	0
6	14	14	5	1	0
18	16	13	4	1	0
20	24	9	1	0	0
21	13	11	9	1	0
TOTAL	91	51	24	4	0

Figure XI
Simulation and Problem Solving:
Non-Technical Group

Assertion	Agree Strongly	Agree	No Opinion	Disagree	Disagree Strongly
5	8	19	4	0	1
6	12	10	8	2	1
18	5	12	15	1	0
20	13	9	7	3	0
21	9	11	9	3	0
TOTAL	47	61	43	9	2

Figure XII
Simulation and Problem Solving:
Technical Group

INSTRUCTIONAL MANAGEMENT

Assertion	Agree Strongly	Agree	No Opinion	Disagree	Disagree Strongly
4	13	23	21	7	2
10	15	21	24	5	1
11	17	22	20	5	2
15	17	26	12	8	4
16	11	19	21	11	5
17	16	27	10	6	7
22	6	19	33	7	1
TOTAL	95	157	141	49	22

Figure XIII
Instructional Management:
Total Response Group

Assertion	Agree Strongly	Agree	No Opinion	Disagree	Disagree Strongly
4	6	8	16	1	1
10	7	9	14	1	1
11	10	9	11	3	0
15	9	13	7	2	2
16	8	9	10	3	3
17	5	15	6	3	4
22	4	9	18	2	0
TOTAL	49	72	82	15	11

Figure XIV
Instructional Management:
Technical Group

Assertion	Agree Strongly	Agree	No Opinion	Disagree	Disagree Strongly
4	7	15	5	6	1
10	8	12	10	4	0
11	7	13	9	2	2
15	8	13	5	6	2
16	3	10	11	8	2
17	11	12	4	3	3
22	2	10	15	5	1
TOTAL	46	85	59	34	11

Figure XV
Instructional Management:
Non-Technical Group

Assertion	Group	Agree/ Agree Strongly	Disagree/ Disagree Strongly
7. Is useful in conveying facts.	Technical	20	10
	Non-Technical	26	1
		chi-sq. = 8.01***	
9. Is useful in defining terms.	Technical	19	11
	Non-Technical	24	1
		chi-sq. = 8.53***	
13. Reduces the amount of time spent in the classroom for routine drill or example presentation.	Technical	26	5
	Non-Technical	31	1
		chi-sq. = 4.78*	
19. Is useful for classroom demonstration purposes for groups of students.	Technical	25	4
	Non-Technical	14	9
		chi-sq. = 4.39*	

*** $P \leq .001$

* $P \leq .05$

Figure XVI
Assertions Viewed Differently by
Technical and Non-Technical Groups

Assertion Number	Need files for this	Is useful, but other techniques more effective	Too expensive	Computer availability critical	Useful with microfiche	Requires a lot of developmental time
	1	2	3	4	5	6
1	0	0	0	1	0	0
2	0	1	1	0	0	0
3	1	0	0	1	0	0
4	4	0	0	1	0	1
5	0	1	0	1	0	0
6	0	1	0	0	0	0
7	3	3	0	0	0	0
8	3	1	0	0	0	0
9	3	3	1	0	0	0
10	0	1	1	0	1	0
11	1	0	0	0	0	0
12	0	0	0	0	0	1
13	0	0	0	1	0	0
14	0	0	0	0	0	0
15	2	2	0	0	0	0
16	1	1	0	0	0	0
17	4	0	0	0	0	0
18	0	1	0	0	0	0
19	0	0	0	0	1	0
20	0	0	0	1	0	0
21	0	1	0	0	0	0
22	2	2	0	0	0	0
23	0	0	0	1	0	0
TOTAL	24	18	3	7	2	2

Figure XVII
Comments

	ASSERTIONS	NO OPINION Frequency	%
4.	Provides individualized student diagnosis and prescription based on past student experience and performance	20	31.8
10.	Is useful in controlling other instructional media such as slide projectors and tape play-back units.	23	36.4
11.	Is useful in directing students to various learning experiences other than and including the computer.	19	30.3
16.	Is useful in administering examinations.	18	31.3
22.	Provides a source of bibliographic references on matters of interest selected by students.	29	50.0

Figure XVIII
Assertions for Which 30% or More
of the Respondents Had No Opinion

	ASSERTIONS	DISAGREE F	DISAGREE %	DISAGREE STRONGLY F	DISAGREE STRONGLY %
7.	Is useful in conveying facts.	8	12.1	3	4.5
8.	Is useful in explaining concepts.	8	11.9	4	0.6
9.	Is useful in defining terms.	8	11.9	4	0.6
12.	Increases the amount of time instructors can spend with students individually.	12	18.2	2	0.3
14.	Makes student learning more systematic and planned.	11	16.7	1	1.5
16.	Is useful in administering examinations.	11	16.4	5	7.5
17.	Provides teachers with information about individual student progress.	6	9.1	7	10.6
19.	Is useful for classroom demonstration purposes for groups of students.	9	13.6	4	6.1
23.	Reduces time spent by students in the drudgery of problem-solving thus freeing time for thought and insight.	7	10.4	3	4.5

Figure XIX
Assertions for Which 15% or More of the
Respondents Either Disagreed or Disagreed Strongly

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