DOCUMENT RESUME

ED 072 219 VT 018 579

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TITLE	PEAPOL (Program Evaluation at the Performance Objective Level) Outside Evaluation.
INSTITUTION	Fresno County Dept. of Education, Fresno, Calif.
SPONS AGENCY	Office of Education (DHEW), Washington, D.C.
PUB DATE	30 Jun 72
NOTE	9p.
EDRS PRICE	MF-$0.65 HC-$3.29
DESCRIPTORS	Achievement Rating; *Behavioral Objectives; Change Agents; *Computer Oriented Programs; Computer Programs; Cost Effectiveness; Educational Innovation; Educational Objectives; Pilot Projects; *Program Effectiveness; *Program Evaluation; School Shops; *Summative Evaluation; Systems Development
IDENTIFIERS	PEAPOL; Program Evaluation at Performance Objective Level

ABSTRACT

In evaluating this pilot project, which developed a computer system for assessing student progress and cost effectiveness as related to achievement of performance objectives, interviews were conducted with project participants, including project staff, school administrators, and the auto shop instructors. Project documents were reviewed and a brief questionnaire was used to obtain student opinions about their experiences with this man-machine system. The system will serve as a valuable change agent if the computer data is used to generate reports which can be acted upon by appropriate personnel. These reports are useful for pinpointing individual and class differences. Suggestions for future applications follow summary statements about the program's success in achieving its objectives. This document is related to a technical manual and a nontechnical manual, available in this issue as VT 018 581 and VT 018 580, respectively. (AG)

Project: 10-10108-0094-71
Part C VEA 1968

COPY #1
PART 3

PEAPOL

OUTSIDE EVALUATION

SUBMITTED TO:

FRESNO COUNTY DEPARTMENT OF EDUCATION

BY

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JUNE 30, 1972

PEAPOL Project Evaluation

INTRODUCTION

The PEAPOL Project objectives, as stated in performance terms in the project application, have been accomplished, with only a few modifications in data input. Performance objectives were written, a system was designed to accept inputs and generate the outputs specified, computer programs were written and tested, orientation sessions were held, PPBS-type budgets were organized for the autoshop classes, and pilot tests were conducted in the schools. The final objective, documentation, is nearly complete.

In evaluating this effort to develop an instructional assessment system, interviews were conducted with project participants, including project staff, school administrators, and the autoshop class instructors. Project documents were studied. A brief questionnaire was used to obtain student opinions about their experiences with the prototype system.

The purpose of these activities was to gather facts and opinions that would indicate:

- How each project objective had been carried out.
- Reactions of users to the instructional assessment system: their views of its strengths, weaknesses, and most promising outcomes.
- Effects of the system on users, and of users on the system.

Information gathered about each objective is summarized and discussed briefly below. Objective 6, the pilot tests, is discussed in greater detail, with remarks about aspects of the system which appeared crucial in this phase. Some additional observations are followed by suggestions for future applications and a statement summarizing this evaluation report.

REVIEW OF PROJECT OBJECTIVES

1. *Performance Objectives.* The performance objectives written by the two instructors for their autoshop classes outlined tasks to be accomplished for each objective in a few sentences. References were given to text materials

students could use for completing each objective.* After this pilot use, one instructor felt that his objectives would need about 25 percent revision, the other, 100 percent. Each had in mind a form of basic overhaul in the presentation of his objectives. One recognized that he had used poor judgment in sequencing objectives (students appeared to want to take them in order, which was not always practical). The other instructor hoped to develop objectives in workbook style, where students filled in their answers. This, he felt, would provide an element of quality control that was missing with the present system. Both instructors thought that computer data about hours used and cost for each objective would be useful in evaluating and revising their performance objectives, as well as their overall course content.

2. *System Design.* The types of information input into the system and the output generated by it were as described in the project proposal, except that lateness data and descriptive data pertaining to teachers were omitted. Perhaps the greatest weakness in the prototype system design resulted from the attempt to write performance objectives of equal difficulty and from allocating an equal cost per unit of time. As proposed by project staff, assigning multipliers to weight objectives for differences in cost and/or difficulty will produce more accurate data for program evaluation. The five-week lag designed into the class progress indicator may be too long: in the final printout two classes were still reported as "progressing normally," even though no time had been recorded for them for several weeks.

3. *Programming.* Computer programs were written with consideration for the experimental nature of the project. Decisions to use a control program, to limit core size, and to provide special error-handling routines, which added to costs, appear to have been well made, since there were no instances reported where the computer components of the system seriously impaired its operation. Project staff suggested modifications in the prototype which would significantly lower costs in a production model, e.g., using mark sense cards instead of key punching and using a larger core or disk storage.

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* Of the 25 students responding to the questionnaire, 17 said they liked having their assignments stated as performance objectives.

4. *Orientation.* Orientation for instructors, administrators, and students was minimal, as was admitted by the project director. Although satisfied at the time that questions had been answered, participants in the pilot project could not anticipate many questions and problems that would arise. With the pilot experience behind them, project staff will be better equipped to demonstrate to future participants how to use the system effectively. Orientation should be strengthened in all areas listed in the project proposal: system rationale, performance objective rationale, input requirements, and particularly, how to interpret and utilize information generated by the system.

5. *PPBS-Type Budgets.* These were developed for the three autoshop classes and incorporated into the system. Budget information was printed out weekly to provide a current status report on uses of project funds. Also, comparisons of budgeted costs and actual expenditures per credited hour and per pupil could be made. In the printout for the final week, all three classes were slightly under the total dollars budgeted.

6. *Pilot Tests.* The pilot tests in the two high schools brought the PEAPOL system concept and design face-to-face with teachers and students in the classroom. The two school contexts in which the tests were conducted were quite different: differences in school programming, in the instructors' teaching methods, and in their uses of the system led to somewhat different outcomes from the pilot tests at the two schools. These differences were apparent in data generated by the computer as well as in opinions expressed by teachers and students.

For example, a striking difference is reported on the Student Summary Report for the last week of the three classes. The printouts show that the average number of performance objectives completed by each student at one school was nearly three times the number completed by students at the other school, yet the average number of objectives per hour was about the same. These data reflected differences in course organization and class scheduling, as well as teacher and student attitudes toward using the system.

During the pilot tests, it became apparent that *how* the assessment system output was used affected its impact on instruction. For example, the most immediately useful output of the system appeared to be the Student

Summary Report. This weekly report was intended for posting for examination by students, so that each could check his progress. At one school, where the report was posted regularly throughout the semester, the instructor said that his students were eager to receive the printouts each week. Of 15 of his students who responded to the question, "Have the weekly reports helped you in any way?" 14 said, "Yes." The instructor cited how one of the poorest students had "pulled himself up by his bootstraps, because of the readout." Most students said they had been helped by the report because it showed them how they were doing in class. At the other school reports were not posted regularly; seven out of ten students there said the reports had not helped them.

The instructors had used (and planned to use further) output data for curriculum revision. Data on the status of individual students and on individual performance objectives could be compared at a point in time or followed over a period of time to note remarkable differences or changes as they occurred. Both instructors cited examples of how the printout data had brought to their attention needed changes in course content or teaching techniques. They said that while they could maintain similar records (e.g., of student time per objective), processing these by hand would be very time-consuming and would produce information in less detail and less often. One instructor said he was developing forms similar to those used for the PEAPOL project. If deprived of the system, an aide could help him keep track of student time and performance.

In the pilot tests the frequency of the computer-generated reports appeared to be an important asset, especially in the classroom. Both instructors recommended that the Student Summary Report continue to be issued weekly (although other parts of the program might be printed out less often). They agreed with students that knowledge of where they stood at all times on each objective was desirable.

The time accounting capability of the system was a major strength, participants seemed to think. One administrator said he felt that the major benefits of the system were not related to its cost accounting output, but to its effect on students' attitude toward time. In his view, the system

provides a graphic way of making students aware of time so that they are more apt to make productive use of it. Both instructors supported this view; both planned to continue using the time clock in future classes. Students were not as enthusiastic, but 19 of the 25 responding to the questionnaire said they didn't mind punching the clock.

Occasional "mistakes" in the pilot test printout reports were apparently caused by omissions or errors in data input. Students were disgruntled when the computer failed to credit them with time on objectives or gave them unfair warning flags; this was usually due to a human failure, resulting from data not being input as required. As discussed earlier, there is need to refine the system programs to allow for weighting performance objectives for different levels of difficulty and cost. Data from the pilot project printouts will be useful in making these modifications, which should also correct discrepancies in issuing warning and merit flags.

The element of quality control was a concern of many who participated in the pilot tests. All felt that this must continue to rest with the instructor. The computer might help, however, by processing and reporting data on levels of performance as judged by the instructor. One instructor recommended adding a quality control component to the time and cost input/output capabilities of the system and advocated including students' grades on the weekly Student Summary Report.

Accurate cost information related to teaching each objective promised to be useful in budgeting for and justifying equipment expenditures and in scheduling equipment use. Cost data would also be useful for program evaluation in cost/benefit analyses of alternative teaching techniques and units of instruction.

7. *Documentation.* Two of the project documents were reviewed for this evaluation: the "User's Manual" and the "Technical Manual." Reviews were by an instructor, an administrator, and the data processing manager, all of whom agreed that the documents appeared to present information about the prototype system clearly and completely. A summary statement briefly outlining the system in lay terms and a step-by-step summary were suggested by reviewers for inclusion in the "User's Manual" (apparently the summary

provided was considered too technical). Since neither of these documents was field-tested, it is to be expected that there will be places where additional information will be needed to clarify procedures.

ADDITIONAL OBSERVATIONS

It has been suggested that the system could be used by administrators as a tool in personnel evaluation. While student performance data generated could be used as an element in instructor evaluation, these data should be related to individual differences in the way the teacher is using the system and to other circumstances, such as class scheduling.

Costs of operation of a production version of the PEAPOL system ($.40 per week per class, as projected by project staff) are certainly within the budget of schools to which the system might be made available. Instructor time must be added to this: the amount of instructor time reported for preparing inputs for the pilot system was 30 - 90 minutes per week. (Instructors said the system had cut down on their paperwork.)

In writing their performance objectives, the two instructors had the opportunity to re-examine their course content and to reorganize and update its subject matter. The PEAPOL project provided them with time to do this. It seems likely that use of such a system (even temporary use) would have an impact on instruction by requiring teachers to perform this type of review and by providing feedback on the expected outcomes of their course revisions.

SUGGESTIONS FOR OTHER APPLICATIONS IN EDUCATION

While it seems particularly suited to skill training-type courses, imaginative teachers in nearly any subject area could use the PEAPOL system for a portion of their courses: for example, as a motivational tool to get students through the more technical or mechanical aspects of academic courses Why should the *entire* course necessarily be monitored? (In effect, this

appears to be what happened at one high school in the pilot study; only a portion of student time in class was monitored.)

The system might be developed as a program assessment tool for educational research to yield data under more controlled circumstances that would help test variables in curriculum, teaching methods, scheduling, teacher-student relationships, etc.

The system might be used for inservice and pre-service teacher education. The impact of the pilot test on the instruction of the two teachers suggests that other teachers, particularly less experienced teachers, might benefit from experiences with the instructional assessment system.

SUMMARY STATEMENT

By its designation, the PEAPOL project's purpose was to investigate the concept of *program evaluation at the performance objective level*. The pilot project demonstrated that computer monitoring of time required by students to complete individual performance objectives is useful for pinpointing differences in individual student performance over time or over a series of objectives; when these differences are detected by the instructor, he can attempt to discover the cause and find the needed remedy. In the same way differences in cost can be analyzed and used by instructors and administrators in adjusting program elements, such as content, scheduling, and equipment purchases and use. The printout reports also document differences between classes. These differences, traced to their causes, may shed light for program evaluation by both instructors and administrators at a more comprehensive level than the performance objective level.

The system can serve as a tool in diverse circumstances: teachers need not fear that, to use the system, they must fit their methods of instruction to a strict format. However, the system will be a useful and beneficial change agent only if it *is* used; that is, if the required data is conscientiously input and if the generated reports are made available to, studied by, and acted upon by the appropriate participants.

Refinements in the prototype PEAPOL system, proposed by the project staff, will be necessary before this tool can operate more efficiently to provide accurate data for instructional assessment. It is hoped that the effort to make these refinements will be supported, and that a production version of the tool will be developed for use in many other vocational education settings and elsewhere.