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ABSTRACT

A model of an evaluation process for a college level mathematics course using management procedures is described. It is suggested that by designing the evaluation process as part of a management procedure, data useful for making policy decisions will be generated and the success of the instructional process will be insured. The foundation of the system is the development of a procedures manual that generates questions about policies that affect the administration, the students, and the operation and effectiveness of the staff and the program. The second phase of evaluation involves data analysis concerning questions of staff size, program structure, attendance requirements, grading procedures, and program costs. Data collection, the third phase, provides a record of student progress and weekly cumulative reports. Quarterly reviews and tutor evaluations are also part of the procedure used. The final phase of evaluation is dissemination of reports to the staff, administrative units, and agencies outside the university. The reports range from one-page summaries to full-scale reports documenting procedures and student achievement. It is suggested that the management approach to evaluation evolved because the success of this program for mathematics depended upon efficient program management as well as quality instruction and materials. The evaluation components of the model are viewed as having a large effect on the success of these programs. (Author/SF)

EVALUATORS AS MANAGERS

by

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INTRODUCTION

Educators have initiated many types of curricular approaches. However, these alternative instructional strategies tend to be expensive. Current demands for cost effectiveness necessitate the integration of management techniques and evaluation data in order to make policy decisions. This paper describes a model of an evaluation process using management procedures.

The components of the model include documentation, revision, and dissemination. These procedures can be adapted to a variety of programs, and they provide not only evaluation data but also a management strategy.

DESCRIPTION OF THE PROGRAM

A pre-calculus math program was developed as an alternative instructional approach for university students entering academic programs which require calculus. It was specifically designed for students who had not received adequate preparation in algebra and trigonometry during high school, or those who did not have the confidence in their skills to enroll in calculus.

This program was piloted in 1974 with 35 students. The administrative effort was directed totally toward the development of the programmed materials. The lack of administrative procedures resulted in an extremely high dropout rate and high numbers of incompletes which were often never resolved. Few records were kept on student progress or program evaluation.

Initially, program policies and procedures developed primarily as a result of crisis situations arising from the nature of the program. After several quarters it became apparent that program changes as well as systematic management procedures and policies were required

to control the dynamic process involved in a self-paced program of instruction.

The first step in organizing the program was to structure the students' study time. A new procedure was initiated which required each student who enrolled in the alternative program to register in a class section. During class time, students studied their programmed materials seeking help from tutors when necessary.

The second major step in structuring the program was the institution of deadlines for material covered. The student could work at his own pace as long as he met the minimum time frame agreed upon by the administrators of the program. Continous testing was made available in a math lab, which was also manned by tutors.

With the increasing size of the program, more efficient management procedures were essential. As a result of these management policies fewer problems arose. The efficiency of the program was the result of several interdependent factors:

1. A graduate assistant was hired to work 20 hours per week to coordinate the tutors and to administer the policies and procedures.
2. A detailed procedures manual was developed.
3. A formalized data collection method was instituted.
4. Data analysis was done on various aspects of the program.
5. A detailed program evaluation was developed as a result of management-generated data.
6. A formalized reporting system of the program evaluation was begun.

The remainder of the paper sets forth a description of the evaluation components of the model and their effects on the success of the program. The documentation stage includes the development of the procedures manual and the collection of data. The revision component includes data analysis and assessment of current policies. The dissemination phase includes all weekly and quarterly reports used to offer documentation of program success.

MANAGEMENT PROCESS

I. Documentation:

The Procedures Manual

During the expansion of the math program various policies, procedures, and rules were developed, both formally and informally, to help alleviate specific problems. These procedures served to provide some consistency in the tutoring, testing, and grading procedures. It became necessary to put all the policies and procedures together so periodic evaluations could be performed, materials could be readily available to orient new staff, and a formal description of the program would exist. A procedures manual was developed during spring quarter, 1979, to document these operations. The manual describes the administrative, testing and tutoring procedures, and the staffing requirements. It also contains copies of all forms used in the operation of the program as well as handout materials prepared for students.**

** See Appendix-Procedures Manual Table of Contents

Because the program continually strives to improve its procedures, which in turn increases student success, changes in policies and/or procedures often occur which require documentation. The procedures manual is used as a guideline for evaluation. It helps generate questions about policy: Are they needed? Are they effective? Should they be changed? It also generates questions about the effectiveness and adequate availability of staff: Are there enough staff to cover the math lab? Are the tutors effective with the students? Do the tutors have the proper skills to be successful as a tutor?

Using the procedures manual as a guide, more reliable and effective decision-making policies are possible. However, competent decision-making can only result from an appraisal of all pertinent information and data around which the decision must be made. Therefore, systematic collection of information and data is essential in producing capable decisions.

Data Collection Process

Student Data: Data on student retention are obtained from daily attendance records and weekly progress reports. The weekly student progress reports are computer printouts indicating students' weekly testing results.

At the end of each quarter data are collected and evaluated on the students who dropped out of the program, when they dropped, and their progress before they dropped.

Final grade sheets are used to determine the number of students who completed the program. Grade distributions are reported. Incomplete grades are then followed-up through the next quarter until they are resolved.

Data on the success of students completing the program before entering calculus and their success in a calculus series is gathered and analyzed in an independent study.

Program Data: Data are gathered throughout the quarter on facility and material utilization by use of a lab request card. These cards are completed each time a test is administered or a student utilizes audio-visual materials. At the end of each quarter, the data from the cards are used to quantify information to generate reports indicating the number of tests administered each day the math lab is open. From this data it is possible to estimate the space needed and staff required. The audio-visual data is used th make decisions on materials required, the number of tape copies needed for projected student enrollment, and the staff requirements (lab assistants) to operate the audio-visual equipment.

Data which are maintained on grade distribution are used to evaluate student success.

Data are collected to ascertain student satisfaction with the program. Students are asked to complete a student satisfaction questionnaire at the end of each quarter. The students rate the course content, tutor effectiveness, and presentation as well as offer suggestions and comments.

Staff Data: Past enrollment and lab utilization data are used to predict staff needs for projected enrollment. The maximum number of students that can be accomodated is computed.

Evaluation data on tutor performance are collected throughout the quarter. Tutors are required to maintain testing and attendance records on the tutored students. These records are evaluated weekly by the tutor coordinator for neatness and accuracy. Written memos are kept on tutors' punctuality and attendance at tutor sessions and tutor meetings. At least once per quarter the tutor coordinator prepares a written observation of each tutor in a tutoring session. The lab supervisor furnishes both written and oral reports of tutor performance throughout the quarter. The tutors are assessed in such areas as punctuality, initiative, cooperativeness, and job knowledge. As a result of these various sumative evaluation techniques the tutor coordinator prepares a student tutor evaluation which is used in the decision for continued

employment. The outcome of such an evaluation process are highly competent and successful tutors which contribute to a successful program.

II. Revision:

Questions Answered by Data Analysis

As a result of the analysis of the collected data, small scale studies are organized to evaluate the necessity and effectiveness of certain policies.

A study was developed and conducted over a two-quarter period on the relationship between success in the course and attendance in class. The results were used as a criteria to evaluate whether or not attendance should be strongly recommended to students.

A study of the incomplete grades was used to evaluate the appropriateness of procedures controlling testing deadlines. Answers to such questions as: "Was the minimum testing schedule realistic?' can be answered by evaluating the incomplete grades and drops.

Data analysis of the math lab video tape utilization

and testing over a period of four quarters are being used to answer questions regarding the appropriateness of the testing facility.

An independent follow-up study was performed to discover how successful the students completing the alternative program were in the first sequence in calculus. This information was used to revise the programmed materials.

Evaluation Process

With the development of the procedures manual and more systematic data collection methods, evaluation of policies and procedures in the program became more concrete. Using the procedures manual as a criteria of evaluation each aspect of the program is assessed quarterly.

The written goals of the program are evaluated according to the measureable objectives built into the system. Changes are made to satisfy the objectives and stated goals.

Using collected data the math lab facility is appraised in terms of its location, size, and availability to students. Final decisions are made on the next quarter's schedule.

The tutorial services are evaluated in areas of total number of tutors needed, availability to students, expertise in content areas, expertise in interpersonal relationships, dependability, and responsibility. As a result of this evaluation, a tutor training program has been developed and implemented to offer tutors understanding and expertise in the tutoring process.

Testing procedures are assessed on the availability of the testing facility, types of test items and their appropriateness, number of tests needed, the effectiveness of test administration, and problems arising from computer generated tests. Those procedures which are not useful are abandoned. Any new procedure which allows a more effective testing process is accepted and tested.

Using utilization data and the procedures manual,

support materials such as audio and video tapes and books are assessed in the areas of availability and staff requirements. Decisions are made for the following quarter and steps are taken to satisfy the projected needs.

Job descriptions listed in the procedures manual of all staff employed in the program are evaluated in terms of stated duties and responsibilities. Each of the job descriptions is appraised as to whether the written procedures and actual practice coincide. Where discrepancies occur, a decision is made to correct either the manual or the practice. As a result, the program has the best utilization of staff hours.

Grading policies and procedures are evaluated on their fairness and appropriateness for such a program, and whether these policies are conducive to the total learning process. Changes are made which will allow the student a greater opportunity to gain the knowledge he needs for success in calculus. One such example is the recent change in policies governing incomplete grades. The former policy

set no time limit for the resolution of incomplete grades. It was found that many of the grades were never resolved. A decision was made to set a deadline for the following quarter after receiving the "I". If not resolved by that deadline, the "I" would become an "E". As a result of the policy change, more "I" grades are resolved.

Students who choose the alternative program must have a comprehensive orientation to the program requirements and procedures. The procedural methods of indoctrinating students in self-paced programmed learning are continually evaluated. The quarterly course student guide is the major source of information for the students. This guide contains all the information the students need to know about course expectations, course content, testing procedures, grading procedures, and testing deadlines. At the end of each quarter, this student guide and the procedures developed to implement it are evaluated on their effectiveness and are changed as needed.

The evaluation process is an ongoing method of assessing

the success of the program in terms of efficiency of staff hours as well as success of the students in the program.

III. Dissemination:

Generation of Reports

The final phase of evaluation is the generation of reports for dissemination to the staff, administrative units, and agencies outside the university.

Attendance and testing reports enable the math faculty coordinator to discuss each student's situation from a knowledgeable position during student conferences. The tutor coordinator compiles weekly attendance records and computer generated reports of students' weekly progress which is given to the math faculty coordinator for her use in student conferences.

A formalized in-house report is written each quarter to document the quarterly business. At times it is beneficial to send this report to individuals outside the program to inform them of its success.

This report contains several distinct sections:

1. There is a detailed description of staff accomplishments, staff changes, and the total number of staff hours employed during the quarter.

2. Test utilization data not only numerically but also graphically depicts daily use, and a comparison chart of the present and previous quarter demonstrates any changes.

3. A materials utilization report shows various data using math lab materials such as audio-visual tapes and books.

4. A comparison of the initial enrollment of the quarter to the final enrollment figures and data on the students who dropped the course are incorporated. Grade distribution as well as a description of resolution of incomplete grades of the previous quarter are evaluated.

5. The final section of the quarterly report is a review and analysis of the student satisfaction questionnaires. Answers to such questions, Why are the students enrolled in the alternative program?, How many hours per day are

the student spending on the course?, Did they think the grading was fair?, Did the students like the programmed materials?, and Did they like the tutors?, are presented. Also included are some general comments to which the student responded.

These reports serve to offer measureable evaluation of program data. The flexibility of the reporting format allows sections of existing reports to be used to send to appropriate administrators outside the program. It allows a formal description to be available to people who inquire about the program. The documentation process inherent in the program provides a history which can be used in planning.

SUMMARY

The management approach to instructional evaluation evolved because the success of this non-traditional self-paced program for mathematics depended upon efficient program management. Good management depends on data which are

easily accessible and quantifiable. Therefore, data collection and analysis becomes part of the management process.

For the management process to be effective, the administrators or managers of the program must also be evaluators of the policies and procedures which govern the program. As a result of the data collection and analysis the administrators can integrate evaluation procedures within the mangement process.

MATH PROGRAM PROCEDURES MANUAL

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