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ABSTRACT

This paper describes a modular program at a community college for instructing non-science majors in college algebra. The two-course sequence is comprised of four modules each and successful completion of a module is required before a student proceeds to the next. Placement, grading policies, and scheduling are all discussed. A formative evaluation of the program is reported and advantages and disadvantages are summarized. (LS)

"Modularization--A Road to Relevance?"

A talk before the Florida Junior College Council of Teachers of Mathematics.

by William P. Palow, Ed.D.

Preface

The program described in the following pages was made possible by a considerable number of people working together as a team. In all fairness two people should be singled for their special efforts. These are Professor Luis Nanney who conceived the original idea and Professor Winston Richter, department chairman, who helped design, set up, and administer the whole program. Without Professor Richter's help the program and resulting evaluation would not have been possible.

Introduction

As you well know as a community college, we at Miami-Dade have the open door and its accompanying problems just as you do. We have pressures from administrators concerning accountability, attrition rates, dropping enrollment and staff reductions. Shifting populations have also added to our problems by changing our student profile. We have found as mathematics departments on our three campuses, that we are increasingly dealing more with non-science and non-transfer students. The North Campus population is perhaps changing the most.

The sum result has been a rethinking of our direction and techniques of teaching. The question we had to ask ourselves was, "How do we adjust our program to provide for the social sciences, business, psychology, and technical students?" That is, "What sort of mathematics is relevant to the non-science major?" At Miami-Dade (North) we had essentially a two track system in algebra. College Algebra, a three hour course, and Algebra-Trigonometry, a five hour course, were the only two choices. Close examination determined that both of these courses were geared toward the physical sciences. Therefore, a committee was formed to structure the content of a course which we could call College Algebra and fulfill the needs of the students with not-so-strong backgrounds in mathematics. The committee recommended that not one course but a two course sequence was necessary to cover the full range of algebraic abilities of these students. These two courses were called Introduction to Algebra and College Algebra. Their content was pared down to eliminate topics which we thought were inappropriate to the needs of this type of students, that is the non-science major. But we felt that this revamping of content was not enough, that we needed a more flexible system than the one envolving the Carnegie Unit of one semester's work. We therefore, decided to

try a modular system.

The Module

It was decided to break the content of the two courses, Introduction to Algebra and College Algebra, into four smaller units each. The units are sequential and no student is allowed to continue until he has successfully completed each previous unit of work.

Each module is comprised of ten days of instruction including review and test days. Each day of instruction is on a different topic with appropriate homework assigned. A typical module consists of the following topics:

Laws of Exponents

Zero and Negative Exponents

Roots and Fractional Exponents

Equivalent Radical Expressions

Multiplication with Radicals

Rationalizing the Denominator

Addition and Subtraction with Rational Exponents

Division with Radicals

After each module of instruction we have a unit exam. If the student passes the exam, he continues to the next module. If he does not pass the exam, he repeats the module.

Placement

Perhaps the strongest selling point of the modular approach as we apply it, is that no student repeats material he has already mastered. Also no student is allowed to attempt a module until he has demonstrated ability in previous modules. Proper placement is the key to the modular approach.

Since our modular algebra is spread over eight modules comprising two courses, MAT 120 and MAT 121, every student is initially enrolled in MAT 120, Introduction to Algebra. The first and second days of class he is pretested. If he passes a particular module or modules he is assigned a grade of "P" for that material. His mark in the course is determined by the modules he does take. Passing and exempting scores are the following: 90-100, A; 80-89, B; 70-79,C; and no score below 70 is accepted. That is, no one may receive a failing grade for a module. He simply repeats the module until a score of 70 is obtained.

Occasionally someone may pass all four of the modules on the pretest. He then is given credit for MAT 120 by exam and is drop/added to MAT 121. In any event, if a student completes the modules in MAT 120 before the end of the trisemester he continues with the modules of MAT 121. Sometimes we have people complete all eight modules in one trimester through a program of individual study.

Grading Policies

The grading scale is the traditional one presented above. The idea is to give the student every possible opportunity to make a good grade but at the same time to demand a high enough standard of accomplishment. The letter grades are assigned by the instructor who has the student on his class roll. (The student is not necessarily with this instructor at any one time.) The grades are assigned by the numerical average of each of the four passing scores of the modules comprising the individual course.

We also assign grades other than "A", "B", or "C". "W's" are given to those students who do not complete three modules in a trimester. These students are required to register for the course the following term. Grades

of "I" are given only to those students who complete three modules by the end of the trimester. The following term he has a choice of just finishing the one module only or finishing that module and taking the modules of the following course.

All grades are kept on cards in a central file in the math office. Each passing module score is recorded in one of the eight blanks on the card. This way a record of all passing scores is available and continuity is provided from trimester to trimester. When a student has passed the sufficient number of modules his instructor at that time sends the card to his original instructor who in turn either assigns him a grade that trimester or sends in a change of grade form from "I", to "A". "B". or "C".

Scheduling of Modules

In order to have the greatest amount of flexibility, we schedule six sections of modular algebra during one time slot, three of MAT 120 and three of MAT 121. This way we can teach a maximum of six of the eight modules which is usually sufficient. We are also able to offer the set of six sections three or four times a day. Night classes are not modularized because we can't offer enough sections at one time.

The cooperation of the six people teaching the six sections is essential. They have to agree on testing dates and work very closely together. For this reason no one is assigned a schedule and each person picks his own. (This is done by a football type draft procedure.)

Evaluation

Perhaps the hardest thing for us to do is to evaluate an innovation to which we have committed so much energy. This is probably the reason so many innovations are not evaluated. But, if we are going to be fair to the student whom we are trying to do the better job of teaching, we

have to evaluate and be prepared to abandon unsuccessful innovations.

To do this we have gathered some data about our program. First, the whole idea of placement depends on how good the placement instrument is. Our program began in the Fall of 1971. Our placement test at that time was subjected to an analysis which showed a reliability coefficient of .86, computed by the Kuder Richardson formula. Biserial correlations on all items were acceptable. The test for the Fall of 1972 had a Kuder Richardson of .90. No beserial r was available on 6 items because so few people completed them. (This resulted in a very small "P" percentage in the fourth module.) There was a total of forty items on each test.

Using the Fall of 1971 and the Fall of 1972, two contrasts were made. First, the daytime unmodularized sections of Fall 1971 were compared to the daytime modularized sections of Fall 1972. And second, the daytime unmodularized sections of Fall 1971 were compared to the daytime modularized sections of 1971.

The comparison was made on the basis of "success" being defined as a grade of "A", "B", "C", or all "I's" subsequently changed to "A", "B", or "C". (All "I's" have to be changed within one trimester after receipt.) Non-success was defined to be all other grades including "W's" and "I's".

The results were the following. When comparing Fall 1971 unmodularized to Fall 1972 modularized we found the modular approach gave us a 7.4% increase in the number of successful students. When comparing the Fall 1971 unmodularized to the Fall 1971 modularized we found a 9.6% increase in the number of successful students in the very first term of the module program.

While these results are not mind staggering, they are realistic evidence that the modular approach does have a favorable effect on the number of successful students. There are many reasons why the increase in success-

ful students is relatively small. One of which is that the standard, Fall 1971, happens to be one of our best trimester in terms of success rate in many years. So, the standard value is really inflated. As for the modularized to unmodularized comparison in Fall 1971, we must remember that this was the first term of any modularization and many kinks had to be ironed out.

Advantages and Disadvantages

The advantages of the modular system are the following: 1) It improves student succes rate, 2) It provides for the whole range of student needs, 3) A student doesn't need to waste time repeating an entire course, 4) A student may progress at his own rate more or less, and 5) A student need not repeat material he already knows.

The disadvantages of the modular systems are the following: 1) It takes more work on the part of the Faculty, 2) It requires more work on the part of the administration, and 3) It requires close cooperation on the part of all parties involved.

Future Directions

The modular system need not be restricted to one subject matter area. It could very well be applied across the lines of the disciplines. A module in logarithms could be taught by the math department as part of a chemistry or physics course or a module in statistics could be taught as part of a biology or business class.

At Miami-Dade Downtown we are indeed considering modularizing our Natural Science area and our Language Institute area to achieve greater efficiency in the student's time. Perhaps the module system will be inappropriate in these areas. We will plan, try, evaluate, and see.