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ABSTRACT

The implementation and results of a project to optimize the learning program at Wytheville Community College are discussed. A systems approach to instruction was selected as the best method of assuring continuing improvement of the teaching/learning process, the productivity of the college, and, ultimately, the long-range goals of the college. An essential element of the project has been in-service training of the instructional staff. The program is described in relation to the following: Systems Approach to Instruction--A Definition; Developing the Program; The Instructional Program; Program Evaluation--Administrative; Student Accomplishment and Response--Program Evaluation; Improved Products and Productivity--An Evaluation; and The Future. (DB)

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PRODUCTS AND PRODUCTIVITY

A PERSPECTIVE ON LEARNING

UNIVERSITY OF CALIF.
LOS ANGELES

DEC 21 1972

CLEARINGHOUSE FOR
JUNIOR COLLEGE
INFORMATION

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Acknowledgments

The program in instructional improvement and its successes reported in this paper have come about because of a commitment on the part of many individuals and groups to the objective of improved learning opportunities for the students of Wytheville Community College. Perhaps the most important group in the implementation of this program, who should receive the credit for its success, has been the college's teaching faculty. The willingness on the part of the faculty to experiment, to utilize new instructional techniques, and to sincerely desire to improve the learning-teaching program at Wytheville Community College has been the real foundation of the program. The cooperation and assistance of the teaching faculty is acknowledged.

Individuals such as Dr. Walter W. Palmer, Dean of Instruction at the college; Dr. W. Robert Sullins, former Dean of Instruction; and Ronald A. Allison, the Educational Development Officer, deserve a great deal of credit for their ideas and efforts in assisting the teaching faculty in implementing the program. The student services division, the learning resources staff and other staff members also contributed to a significant degree to the program's success.

It should also be noted that the Developmental Studies Program's staff, James S. Presgraves, Director; Richard Brewer; and Deanna Bowman developed the program described in the chart entitled "Different People Learn Differently" which was published in a progress report of the Developmental Studies Division entitled "The Story of Project Trans-Montane: 1970-71."

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Introduction

Since 1968 Wytheville Community College and the Junior and Community College Division of the National Laboratory for Higher Education have engaged in a joint endeavor called, "Focus 70's: Improvement in Instruction." The goal of this project is to optimize the learning program at Wytheville Community College.

This unusual partnership developed through the initiative of the Laboratory's staff, which provided practical ideas based on theory and research, and the staff of the college in applying those ideas, testing them, and modifying them to suit the unique environment within and immediately external to Wytheville Community College. This project, which was partially funded under a grant from the Developing Institutions Program of the U. S. Office of Education, continues to concentrate on the need to develop an instructional program which is relevant to the learning capabilities of students from the rural Appalachian section of Virginia in which the college is located.

The college has committed itself to accountability for both learning and instructional relevance. This commitment has grown out of a realization that our educational institutions have been placed in charge of the nation's most precious resource, its young people, and that to be accountable the colleges must have developed this resource efficiently and effectively. Past practices of controlling the quality of the product through high attrition rates are no longer acceptable to the American people. Thus, colleges must now focus on providing appropriate and rewarding learning experiences for all of their students.

As a result of this commitment, the Wytheville Community College faculty adopted, through an anonymous "frequency response analysis" technique, a long range goal to improve instruction, response and accomplishment on the basis of student evaluation and achievement. A systems approach to instruction was selected as the method best suited to assure continuing improvement of the teaching-learning process, the productivity of the college, and ultimately the long range goals of the college. An essential element of the project has been to conduct in-service training to familiarize the instructional staff with techniques of clearly defining desired educational outcomes and of the various learning techniques available in contemporary America.

This program, designed to provide accountability for optimal student learning, has been evaluated in depth over the past three years on a continuing basis. Positive results in increasing student learning and thus increased productivity of the college have been observed through these evaluations. The implementation of the program and the documented results are outlined in this paper.

A Definition

Systems Approach to Instruction

A systems approach to instruction means a systematic approach to teaching and learning. It features specific behavioral objectives and a series of learning activities for each unit of instruction. The objectives define what a learner will be expected to demonstrate successfully at the completion of a course or unit (i.e., stipulate expected measurable changes in learner behavior.)¹

These objectives are the "road maps" for arriving at a learning-oriented instructional program. Just as a home builder would not begin to construct a dwelling without plans (objectives), an instructor cannot expect to develop a successful learning experience without knowing what end result is expected.

The following are examples of specific behavioral objectives developed in the College's biology, economics, mathematics and nursing departments and describe what the student should be able to do after participating in certain learning activities:

Biology. Identify the basic units of cell structure and describe the function of each.

Economics. The students will list and describe the five determinants of demand.

Mathematics. Given twenty-five mathematical computations, the student will correctly solve twenty by using procedures demonstrated in class.

Nursing. Given a sphygmomanometer and a stethoscope, the student will correctly obtain an arterial blood pressure reading.

Learning activities are designed based on those specific changes in behavior desired in the learner at the end of the instructional unit. Learning activities may involve listening to live or taped lectures; completing programmed instructional units; working with tutors; viewing films, filmstrips, and slides; taking trips to observe practical application of principles and theories; completing units of computer assisted instruction, participating in discussion groups or listening to outside speakers.

In the systems approach to instruction, learning activities are selected and arranged in a sequence that will provide optimal learning experiences. The learning activities for a specific unit may need repeated revision depending on the evaluation of student performance, and on suggestions made by students.

Developing the Program

Just as an instructor must be able to define the desired outcomes of his course and devise a series of learning activities to assist the student in achieving the outcomes a college administrator must be able to define the desired outcomes of instructional improvement programs and provide appropriate learning activities to assist

the teaching faculty in achieving the objectives. These faculty learning activities are commonly referred to as "in-service training" and are essential to any program of faculty development.

The Wytheville Community College faculty spent the 1968-1970 period developing specific behavioral objectives for each unit of instruction as a result of a faculty in-service training project whose initial goal was to bring the community college philosophy into better focus, and which later evolved into a program focused on meeting the instructional needs of the community college student. The faculty and staff of the college quickly recognized that quality instruction is a real need of the college student today. In fact, the top priority objective in the college's institutional objectives (both short and long range) has been and still is the accountability for student learning as measured by student response and accomplishment.

In addition to the help of NLHE's Junior and Community College Division, expert assistance also was provided by a number of other national leaders in the community junior college field. Dr. Kenneth Skaggs, Dr. Max Raines, Dr. John Roueche, and Dr. James L. Wattenbarger assisted the faculty in developing a clear, consistent community college philosophy, and provided insights into the needs of the community college student.² Also, Dr. S. M. Postlethwait, professor of Biology, Purdue University, who pioneered the audio-tutorial approach to instruction at Purdue, provided valuable counsel for the faculty during their efforts to understand and develop the systems approach to instruction.³

The latter part of the 1969-1970 year, the summer of 1970, and the four-week faculty workshop prior to the 1970 fall session were devoted to developing a systems approach to instruction and, in some cases, to individualized instruction.⁴ During the summers of 1970 and 1971 several individual faculty members concentrated for three to five weeks on curriculum development with an emphasis on systematizing parts of one or more courses. In fact, during the past three years the college has invested more than 300 full-time faculty weeks in planning. This is the equivalent of ten instructors planning full-time for one year.

In addition, by the fall of 1971 the college had committed more than \$100,000 to equipment and supplies to implement the instructional reformation project. The criterion for committing those funds for supplies and equipment, and also other money for travel has been budgeted on the criterion the degree to which each proposed expenditure was expected to contribute to instructional improvement.

The Instructional Program

Individual instructors proceeded differently attempting to integrate the new instructional techniques into the instructional program. For example, some courses have been completely systematized, others have been completely individualized, while others have individualized key concepts within a systematized course. In the latter case individualized instructional units have been developed (both audio-tutorial and workbook style) and unit mastery is insisted upon for each student.

One instructional group which has completely individualized its courses and incorporated many other techniques to help the student learn has been the college's Development Studies Division. The basic principles on which the developmental studies program is based are that the interests, ambitions, and capabilities of each student are different and that for an educational program to be meaningful, each student must be dealt with on an individual basis. The program features completely individualized instruction, student tutors, nonpunitive grading, a flexible calendar, and motivational techniques packaged so as to focus on the individual learning capabilities of each student. The basic educational program is dovetailed with such activities as extensive counseling, student activities, and cultural activities in an effort to interest, to motivate, and to develop each student enrolled in the program.

Of interest is the fact that the Developmental Studies Division's staff are convinced that a student should not be required to needlessly cover any previously mastered course material. Therefore, entering students are tested in each area to determine their performance level. After determining this level they are placed in a unit in which they can reasonably be expected to proceed. Chart 1, entitled "Different People Learn Differently," demonstrates the channels and possibilities used to help the students achieve unit mastery.

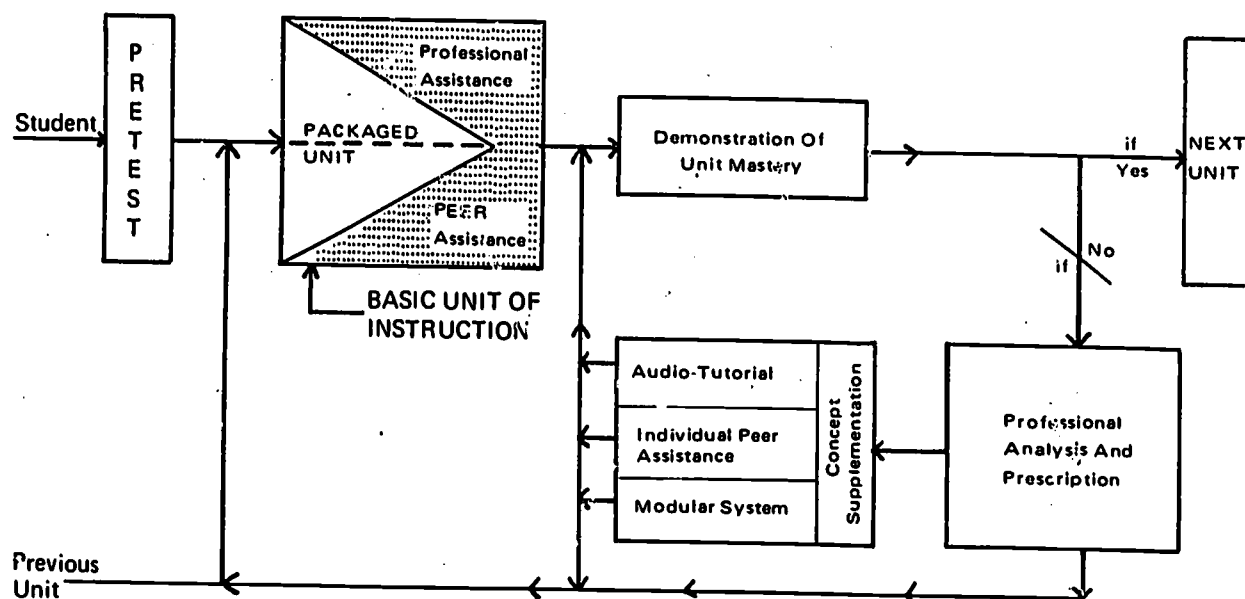


Chart 1. DIFFERENT PEOPLE LEARN DIFFERENTLY

The chart illustrates how the learning capability of each student is dealt with on an individual basis. Each course of instruction is composed of a sequence of individualized units with the student being placed in the appropriate unit on the basis of a pre-test.

After working through the self-instructional unit at his own pace with professional and peer assistance, the student is tested to determine if the objectives have been mastered. The student's performance is analyzed and supplemental work may be prescribed by the professional teacher. The supplemental work may include a different approach to a particular concept, a complete reworking of the unit, or going back to a preceding unit in the sequence.

If a particular concept has been missed, the professional teacher may prescribe either audio-tutorial in-

struction, modular instruction, or individual peer assistance in approaching the concept in a different manner. The manner chosen depends on the professional judgment of the teacher who has additional insight into the student's learning capabilities because the instructors also serve as counselors. The audio-tutorial instruction may include films, filmstrips, slides, or tapes. Modular systems may be programmed instruction units, while peer assistance may include either individual assistance or group discussion. Any of these three approaches may be used for supplemental work, or peer assistance may be integrated into the audio-tutorial or the modular systems approach.

Administrative

Program Evaluation

In evaluating the program the college has considered faculty reaction, effect on grade point averages, student mastery of stated objectives, student reactions, and continued evaluation of measurable progress toward the college's prime goal. This evaluation has been conducted by the college's Dean of Instruction, Dr. Walter W. Palmer, and the Educational Development Officer, Ronald A. Allison. The educational development officer (EDO) for instruction is another NLHE developmental product which has been incorporated into the Wytheville Community College program. The EDO is an internal staff member who specializes in instructional technology and strategies for constructive change.

Faculty reaction to the program has been solicited through periodic anonymous questionnaires, while student opinions have been secured through random sampling. The real effect (or success) of the program has been determined through the evaluation of student mastery of course objectives over several quarters while taking into account the student characteristics as well as the instructional techniques.

During the summer of 1971, the educational development officer evaluated the courses to be offered in the fall term, and found that 87 percent had been developed based on specific behavioral objectives. Also, 84.6 percent of the courses had been developed with a variety of learning activities included, and in most cases this represented a second or third effort in establishing an optimal sequence of those activities.

In the fall of 1970 an anonymous sampling of faculty opinion regarding the implementation of a systems approach to instruction was secured through a questionnaire. Ninety-seven percent of the college's teaching faculty indicated that they felt that the utilization of specific behavioral objectives had increased their knowledge of teaching and learning. A majority of the faculty also indicated a desire to implement the systems approach to instruction in their courses.

Student reaction to the use of specific behavioral objectives has been favorable: a sampling of opinion from students who took courses using objectives indicated that virtually all felt that this approach assisted them in mastering the courses. Students were especially enthusiastic about having the objectives made available at the beginning of each instructional unit.

During the 1970-1971 year, Wytheville Community College was selected as one of a hundred colleges to participate in "Project Focus--Strategies For Change," a national evaluation funded by the Kellogg Foundation and conducted by the American Association of Junior Colleges. In this project, selected Wytheville Community College students and faculty members participated in an institutional self-study using instruments provided by

the American College Testing Program.

The evaluation revealed that Wytheville Community College Students found that the majority of the college's teachers: (1) prepared their material in an organized and precise manner (a natural outgrowth of a systems approach to instruction); (2) encouraged student participation in the classroom; (3) distinguished adequately between major and minor points; (4) were in touch with student life; (5) cared if the material presented was understood; (6) were not uneasy or nervous; and (7) did not criticize or embarrass students. A vast majority of the students also indicated that the faculty academic advising program and the counseling provided by the student services personnel were extremely valuable and worthwhile.

As a result of the improved learning, (as measured by student performance) an analysis of the grade point averages for selected courses and for the entire instructional program has been developed. Examination of the distribution of grades for the total student body has revealed a trend toward better grades each quarter even though there has been no substantial change in the student body as characterized by class standing, standardized test scores, etc. In addition, a substantial number of faculty members feel that students in their classes are mastering the material better and that this is reflected in better grades.

A year-long evaluation of the grade point average of one instructional department which utilized a systems approach to instruction extensively, and which also offered courses across the breadth and depth of the student body, indicated that a 15 percent increase in the grade point average occurred for all students in all courses in the department. The department (from which each regularly enrolled student must take at least one course) observed that the student grade point average increased from 2.13 to 2.54 over the one-year period although no substantial change took place in student characteristics. This same phenomenon has been observed in other departments in varying degrees.

It is also significant to note that the failure rate (D's and F's) fell from 19 percent in the winter quarter of 1970 to 14 percent in the winter quarter of 1971. The percent of absolute failure (F's only) fell by almost 50 percent from 7.4 percent F's to 4.0 percent F's during the same one-year period.

Program Evaluation

Student Accomplishment and Response

In an effort to determine if a positive relationship existed between the implementation of the systems approach to instruction and the improved grades during the 1970-71 school year, the EDO divided the faculty members into three groups. Three classifications were established based on whether the faculty members' implementation of the systems approach was normal, substantial, or extensive. The percentage of A's and B's (a definition of course mastery) for the 1970-1971 and 1969-1970 years was computed for each group.

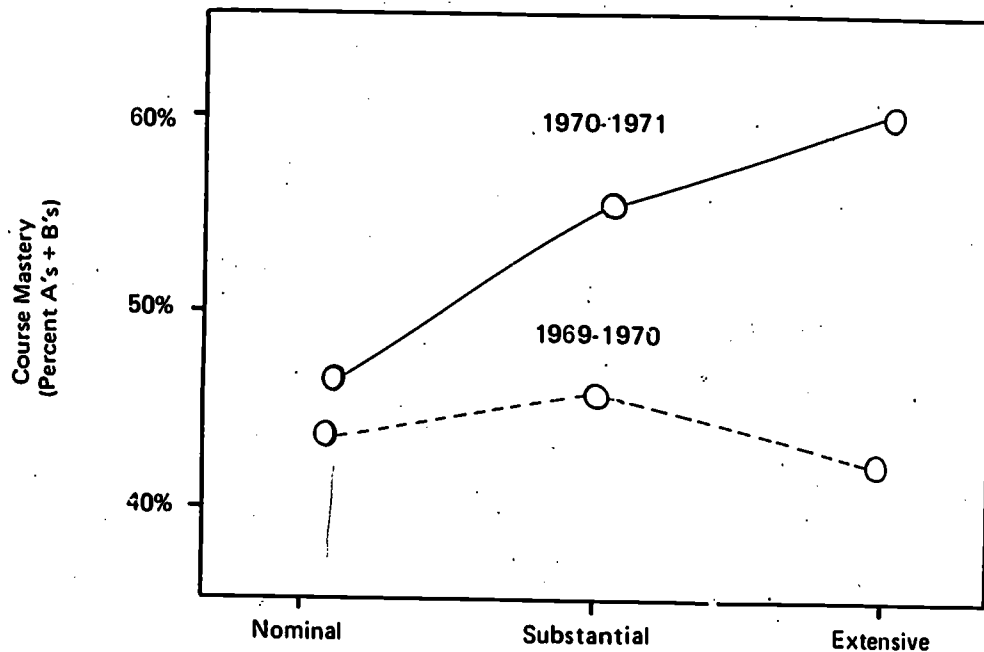


Figure 1 - Instructor Groups by Degree of Use of Systems Approach
UTILIZATION OF SYSTEMS APPROACH VS. COURSE MASTERY

Figure 1 shows the relationships between these variables and dramatically points to the increased percentage of students mastering the courses through the systems approach. During the 1969-1970 year before extensive development of the concept, there was little difference between the three groups of faculty. The students of the two groups classified as employing substantial or extensive use of the systems approach, show a substantially higher degree of course mastery for the 1970-1971 year than did the third (nominal) group. They also show a substantial increase in course mastery over the 1969-1970 year.

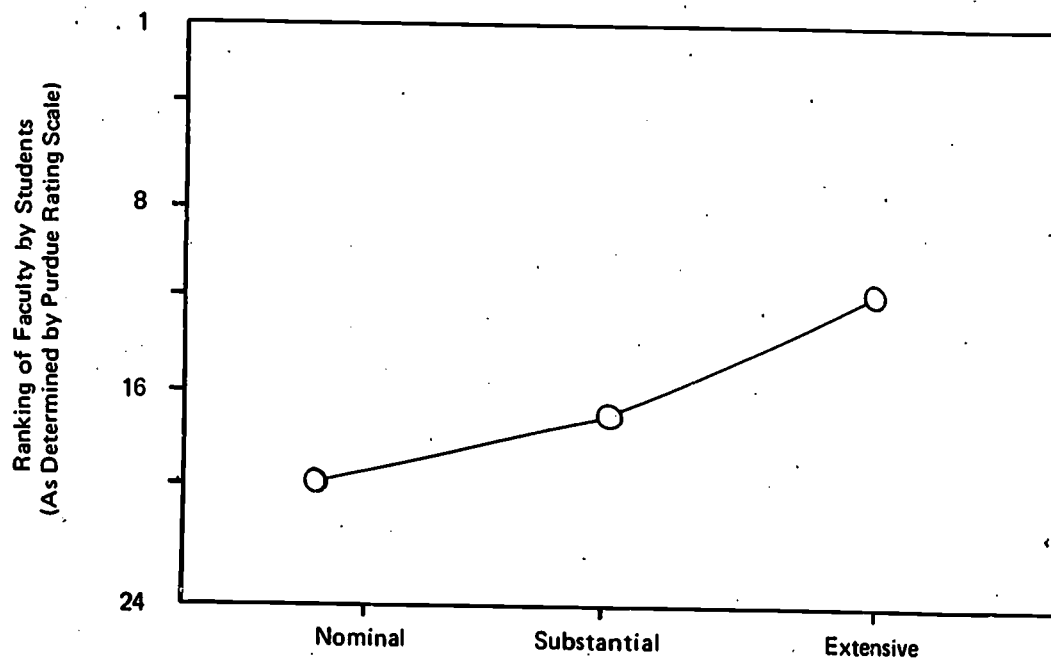


Figure 2 - Degree of Use of Systems Approach By Instructor Groups
DEGREE OF USE OF SYSTEMS APPROACH VS. STUDENT RANKING OF FACULTY

To determine what the students thought of these new instructional techniques, the average rankings of the three groups of faculty (as determined by the local norms generated by the Purdue Rating Scale of Instruction in the spring of 1971) were compared as shown in Figure 2. The results indicate a definite appreciation of the systematic approach to instruction on the part of the student.⁵

An Evaluation

Improved Products and Productivity

A number of conclusions and implications for colleges can be drawn from these data. First, it must be recognized that if both faculty and students think that a systematic approach to instruction improves the teaching learning process then this feeling partly validates the basic assumption on which the program was built. Beyond this simple validation the conclusion has been further strengthened at Wytheville Community College by empirical data which demonstrate that course mastery is increased through use of the concept.

Several questions can be put forth about these results. Could the improvement in grades be attributed to easier grading on the part of the faculty? Could the increase in grade point averages be related to better students in the individual classes as a result of improved placement through the counseling services? How many students are graduating, and, how are the graduates of the college performing?

To the question, "are the faculty members grading easier?" individual faculty members said no: In fact, some instructors who have continued to use standardized tests keyed to a basic text over a number of years have witnessed notable improvement in grades. However, it should be noted that in developing a limited number of specific behavioral objectives for a course one may effectively reduce the scope of the course and consequently narrow the scope of the learning process. The college's faculty have indicated that they are aware of this possibility and are considering it as they develop the instructional program.

During the 1970-71 school year there was an improvement in the placement through counseling; however, the conclusion was that this had done more to reduce the percent of failures than to increase the percentage mastering the courses at an "A" level. This resulted in skewing the grade distribution to the right.

To consider an important indicator of a college's increased effectiveness, a report on the follow-up studies of all students at Wytheville Community College during the 1969-1970 year revealed that 195 out of 726 full-time students entering in the fall of 1969 achieved their educational objectives (not necessarily graduating) at the college during that year. By projecting this figure to a two-year period ending June 1971, it was found that more than 70 percent of those full-time students who should have completed their objectives did so. These percentages compare very favorably with those in most other colleges.⁶

Also, in terms of the percentage of annual full-time equivalent students graduating it has been determined that the percentage was 8.4 in 1967-1968; 17.2 in 1968-1969; 17.8 in 1969-1970; and 22.7 in 1970-1971. One will notice that there is constant improvement year by year.

Wytheville Community College students are getting better and better grades; more and more are graduating; and a higher percentage are achieving their educational objectives. But what about the performance of those graduates? The 1968-1970 three-year comprehensive follow-up study⁷ found that former Wytheville Community College students are in fact performing well on the job and at four-year colleges in the case of transfer students.

The records of the 89 students transferring in 1968 and 1969 showed a slight grade point drop in their first term as compared to their WCC averages. Two years later the same 89 had a composite grade point average of 3.200 at senior colleges compared to their average of 2.717 for their two years at the community college at the time the survey was completed in 1971.

Likewise, the success of those going directly into the world of work from the college has been documented in the publication, *Three Years in Retrospect: A Follow-Up Study of Graduates for 1968-1970*. This documentation has drawn widespread comment attesting to its quality.

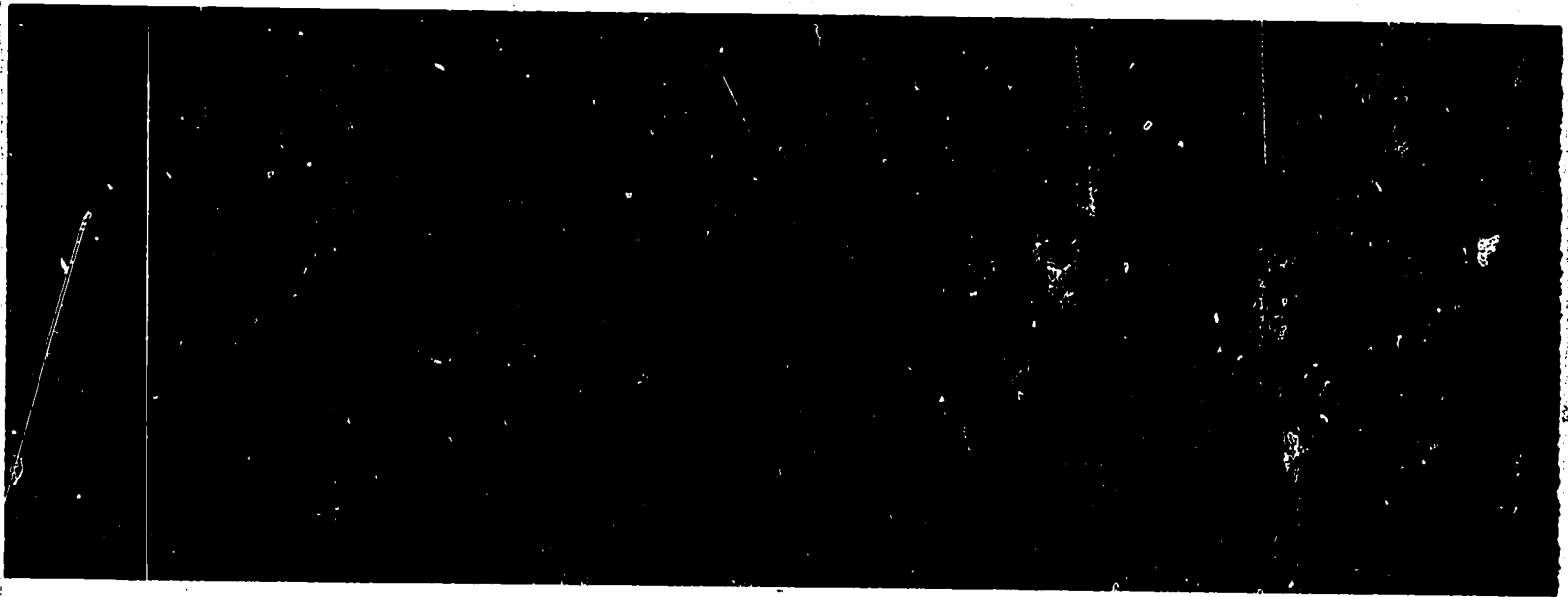
The Future

Whether or not the college's graduates will continue to perform as well as they have in the past is a question to be answered by future studies. These studies will be conducted because the first of six points in the college's accountability development program is the requirement of an annual follow-up of all students leaving the institution. However, every available indicator would point to improved performance on the part of those going to the world of work or to senior colleges and universities.

In the future the college plans to work toward improvement in the learning process through continued emphasis on a systematic approach to teaching. The development of the program will feature in depth evaluation of the products and productivity of the college, an orderly move toward direct measurement of teacher effectiveness, and the continued development of a sense of accountability for student learning on the part of all persons associated with the college.

Notes

1. Mager, Robert F. *Preparing Instructional Objectives*. Palo Alto, California: Fearon Publishers, 1962, p. 3.
2. Gilley, Wade J. *Focus 70's: A Report on Improvement in the Instructional Program at Wytheville Community College*, Vol. I. Wytheville, Virginia: Wytheville Community College, June 1970.
3. Gilley, Wade J. and Walter W. Palmer. *Focus 70's: Instructional Improvement - An Accounting*, Vol. II. Wytheville, Virginia: Wytheville Community College, June 1971.
4. Both Wytheville Community College and the NLHE Junior and Community College Division distinguish between a "systems approach to instruction" and "individualized instruction." Briefly, the difference is that a systems approach is a recurring cycle of steps applied to improve instruction until most students master most objectives. Individualized instruction, on the other hand, can take such diverse forms as independent study or tutoring, or can be combined with a systems approach. The Junior and Community College Division formally describes this combined approach as a "systems approach to individualized instruction."
5. Note: A high score on the Purdue Rating Scale indicates an unsatisfactory rating, and a low score represents a favorable rating.
6. California Legislature. *The Academic State*. Sacramento, California, 1968.
7. Gilley, Wade J. and Norene Holston. *Three Years in Retrospect: A Follow-Up Study of Graduates for 1968-1970*. Wytheville, Virginia: Wytheville Community College, June 1971.



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