

THE THIRTEEN-COLLEGE CURRICULUM PROGRAM:
A STUDY OF TEACHERS' ATTITUDINAL CHANGE
TOWARD AN INNOVATIVE SCIENCE CURRICULUM

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This is to certify that the
thesis entitled

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CHANGE TOWARD AN INNOVATIVE SCIENCE CURRICULUM
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ABSTRACT

THE THIRTEEN-COLLEGE CURRICULUM PROGRAM: A STUDY OF TEACHER ATTITUDINAL CHANGE TOWARD AN INNOVATIVE SCIENCE CURRICULUM

By

William M. Clark

The purposes of this study were to investigate science teachers' attitudinal changes toward an innovative science curriculum and to ascertain what variables were pertinent to these attitude changes. The population consisted of 55 college science teachers assigned to participate in the program beginning with the summer of 1971.

The instruments used to measure attitudes, changes, and knowledge of science were: the Faculty Questionnaire, the Summer Assessment Questionnaire, and the Sequential Test of Educational Progress (STEP).

The Faculty Questionnaire was administered near the beginning of the summer conference and again in January, 1972. The Summer Assessment and the Sequential Test of Educational Progress were administered only once: near the end of the conference for the assessment

questionnaire and near the beginning for Sequential Test of Educational Progress.

The pertinent findings of this study were:

1. There was a significant positive correlation between teachers' attitude scores and the amount of formal science training.

2. There was no significant correlation between males and females and their attitude scores toward an innovative science curriculum.

3. The correlation between teachers' attitudinal scores and major teaching area was nonsignificant.

4. The number of years of teaching at the college level and the teachers' attitude scores appeared to be nonsignificant.

5. The number of contact hours required of teachers in the program and their attitude scores were significantly positive correlated.

6. Teachers' knowledge of science and their scores on the attitudinal scale did not appear to be significantly correlated.

7. Attitudinal scores of the teachers and their chronological age were not significantly correlated.

8. Attitude scores toward the summer conference and attitude scores toward an innovative science curriculum were found to be significantly positive correlated.

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William M. Clark

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CHAPTER I

STATEMENT OF PROBLEM

The problem of this study is divided into three phases. Phase I of this study investigated the teachers' attitudes and attitudinal changes as to (1) students, (2) teachers, teaching and teaching methodologies, (3) colleges/and universities, (4) institutions' policies and administrators, (5) curriculum and curriculum development, and (6) the Thirteen-College Curriculum Program* In-service Summer Conference.

The second phase of this investigative study was to determine the relationships of the teachers' attitudes and attitudinal changes as to (7) amount of science training, (8) teaching experience, (9) science competence, (10) class load (number of contact hours), (11) sex, and (12) science area.

The final phase was a continuation of the second phase in that it sought to determine the relationships of the teachers' attitudes and attitudinal changes toward the (13) Thirteen-College Curriculum Program's In-service Summer Conference(s) and (14) the teachers' opportunities

*Hereafter may be referred to as the TTCP.

to implement the new teaching strategies and materials following the in-service summer conference.

The study procedures elicited data used to study the following items:

1. Teacher attitudes and attitudinal changes as revealed by Part II of the 1971 Curriculum Development Summer Conference Faculty Questionnaire.

2. Teacher attitudes and attitudinal changes as related to amount of science training, teaching experience, class load (number of contact hours), sex and science area as obtained from Part I of the 1971 Curriculum Development Summer Conference Faculty Questionnaire.

3. Teacher science competence as measures on The Sequential Test of Educational Progress.

4. Teacher attitudes and attitudinal changes in relationship to the Thirteen-College Curriculum Program In-service Summer Conference and teacher opportunities to implement new teaching strategies and materials following the in-service summer conference as reported from the Follow-up Thirteen-College Curriculum Faculty Questionnaire.

Need for the Study

A review of the literature reveals that little effort has been exerted to determine quantitatively college teachers' attitudes and attitudinal change toward an innovated science curriculum and the effect of in-service

training by subsequent implementation of the new curriculum. The literature regarding pre-service training in this area for college teachers is also minimal of research findings.

Hare states, "Implementation of any new curriculum material depends upon the extent and quality of in-service education of teachers in the new material."¹

Foshay wrote in the Foreword of Innovation in Education:

Most reports of innovational activities have focused on content of change; they nearly always ignore or oversimplify the change process involved. We need to know much more about how educational innovations are introduced and adopted--or rejected.²

Noda has described additional "blocks" to the implementation of "new" curricula. This block arises out of the attitude of the teacher and the nature of teacher relationship with the administrators and with other teachers.³

According to Mayhew, while much learning has taken place through the traditional devices of books and abstract discussion, there has grown up the feeling that classroom experiences should be greatly enriched or changed if the

¹ Kenneth Hare, On University Freedom (Toronto Publisher in association with Carleton University by the University of Toronto Press, 1968), p. 63.

² Arthur W. Foshay, Foreword in Innovation in Education, ed. by Matthew B. Miles (New York: Teachers College Press, 1971).

³ Daniel S. Noda, "A Study of Successful Practice Used to Remove the Major Blocks to Curriculum Improvement in the Secondary School" (unpublished Ph.D. dissertation, Ohio State University, 1952), p. 78.

optimum potentialities of a collegiate education were to be realized. This thesis presents the "extent" of in-service training of college teachers relative to attitudes and attitudinal changes by analyzing the questionnaire response received from the Thirteen-College Curriculum Program teachers.⁴

Mayhew points out that a large number of American faculty members seem unaware of just how much innovation is in progress. Many institutions of higher education do not have adequate abstracting facilities nor bibliographic aids to keep informed of the many changes occurring. On the positive side is the existence of many innovations and the fact that faculties are interested, once they hear of them. The climate, then, seems right for innovation to become more important in all of higher education. Before this can happen several factors are needed for implementation to occur.

First, it can be assumed that the forces or conditions demanding innovation will not diminish in pressure. Numbers, cost, and changing society have become characteristic of the United States in the last half of the twentieth century. Thus the challenge remains.

To what extent do teachers' attitudes reflect the effectiveness of an in-service program?

⁴Lewis B. Mayhew, Higher Education in the Revolutionary Decades (Mucutcher Publisher, Corp., 1967).

The teachers education program exists also to help teachers change. What does assessing this change and its relationship to the format of the teacher education program require?

Data of this nature should be extremely valuable in the selection of teachers for innovative science education. Also, data of this kind should aid in determining the extent to which the Thirteen-College Curriculum Program's educational training program fulfills its role as an influence factor in bringing about changes in teachers' attitudes and their acceptance of an innovated science curriculum. Further, these data may be used as a source of feedback for revision of the teaching strategies and materials used in TCCP. Since TCCP is an experimental program, the data collected may be used for the purpose of improving the program.

Background of the Problem

Within the past decade widespread changes have taken place in the structure and function of American education. Hopes for "revolution" and "reform" are high, and action is not lagging. Innovations such as programmed learning, team teaching, educational television-set theory--to name a few--are being invented, recommended, and tried at an ever-increasing pace.

During the past fifteen years we have witnessed changes in the teaching of science at all levels of

education. Those changes are most prevalent in the secondary and elementary schools; relatively few are at the college level. We have moved from a didactic form of presentation, where an accumulation of functional material was of utmost importance, to the inquiry approach, where the student learns science by participating in various experiments. However, for the most part, we find that at the college and university level there is still a great percentage of science courses being taught as a body of classified knowledge rather than an approach to problem-solving or an association of facts culminating in a concept as a principle. The type of teaching in vogue at the college and university level still results in students memorizing encyclopedic lists of facts completely divorced from a development of an understanding of the nature of science. Hurd, in describing the teaching and learning process at the college and university level, states: "teachers have been so concerned with the answers the students give, that it is forgotten that science is more a verb than a noun."⁵

Many of our colleges and universities have shown hesitancy to foster change or a departure from traditional practices. The fault cannot be in the lack of suitable

⁵Paul D. Hurd, "The Educational Concepts of Secondary School Science Teachers," School Science and Mathematics, 1954, 55:89-96.

materials, for in the last decade the National Science Foundation and other groups interested in science education have developed a broad variety of instructional materials designed to present science in a way that embodies contemporary thought on educational processes. There are those who feel that this hesitancy can be explained by the fact that most of the new programs in science have been developed outside of the college or university setting, with support of Federal funds. Others object because universal implementation of these new materials would in effect establish a national curriculum. According to Uricchio, the real reason why there is a lag in the implementation of various new curricular materials is not the fact that they were born outside of the usual delivery room, but rather because they represent a substantial departure from traditional instructional procedures in the schools. To put it bluntly, their pedagogical discomfort index is high.⁶

If we are agreed that there has been a certain degree of hesitancy in adopting the new curricular materials and thus changing the methodology of teaching science, what is our role as college or university faculty? There are many avenues that can be followed which can help

⁶William Uricchio, Innovation in Higher Education (Columbia Teachers Press, Columbia University, 1967), pp. 22-24.

aid faculty members with the understanding of what alternatives exist and at the same time bring about improvements in the current offerings. One such alternative is better pre-service and in-service training of teachers. This does not necessarily imply pre-service or in-service education should prepare teachers to teach a prescribed biology, physics, or chemistry curriculum, but rather that they be made aware of the underlying philosophy of modern day science courses and understand what is meant by the discovery approach, inquiry, the investigative approach, and open-ended type of activities.

Methodology of the Study

The major purposes of this study were: (1) to ascertain the attitude changes of science teachers toward an innovated science curriculum as a result of a summer conference training program implemented by the Curriculum Resources Staff at Bishop College during the summer of 1971, and (2) to ascertain what variables are germane to attitudinal changes of these teachers toward a "new" curriculum.

Hypotheses of the Study

This study encompassed the qualitative aspects of teachers' attitudes and attitudinal change toward the TCCP in science.

1. There is a significant correlation between teachers' attitudes and attitudinal change due to sex.
2. There is a significant correlation between teachers' attitudes and attitudinal change due to major area of science.
3. There is a significant correlation between teachers' attitudes and attitudinal change due to the amount of science training.
4. There is a significant correlation between teachers' attitudes and attitudinal change due to amount of teaching experience.
5. There is no significant correlation between teachers' attitude and attitudinal change to chronological age.
6. There is a significant correlation between teachers' attitudes and attitudinal change as related to classload (number of contact) hours).
7. There is a significant correlation between teachers' attitudes and attitudinal change as related to teacher competence.
8. There is a significant correlation between teachers' attitudes and attitudinal change toward the TCCP Summer Conference.

Definition of Terms

The following are definitions, statements or assumptions as they are used in this dissertation.

The TCCP teachers were those teachers who participated in the 1971 TCCP Summer Conference Workshop and taught the TCCP for at least one term following the summer conference.

Innovation, according to Miles, is deliberate, novel, specific change, which is thought to be more efficacious in

accomplishing the goals of a system. The element of novelty, implying recombination of parts or a qualitative difference from existing forms.⁷

In-service training was defined as any instruction received by any teacher having preconceived and intentions of implementing the methodologies and materials of the TCCP following the training period.

Teachers' attitudes and attitudinal changes were defined as the teachers' score card changes in scores on the 1971 Curriculum Development Summer Conference Faculty Questionnaire.

Teachers' competence was defined by the TCCP teacher's score on the Sequential Test of Educational Progress, Science 1A.

Delimitations and Assumptions of the Study

All phases of the study were carried out in connection with 57 teachers representing 28 predominantly black institutions of higher learning; all except one is considered to be geographically located in the south. The study did not attempt to:

1. assess the effectiveness of the TCCP science program by measuring changes in the students' attitudes as gains in knowledge

⁷Matthew B. Miles (ed.), Innovation in Education (New York: Teachers College Press, 1971).

2. assess the science content acquired by the TCCP participants in the workshop
3. assess difference in amount of administrative, consultative assistance or direct supervision received by the participants as provided by the TCCP staff
4. assess other areas of disciplines of the TCCP
5. assess or measure the rate of innovation
6. measure or assess the rate of attitudinal change.

It was assumed that the instruments used in conjunction with the study were valid for the purposes intended, and the teachers of the population were intellectually honest in their responses to the instruments.

Organization of the Dissertation

The general organizational plan of the thesis is as follows: in this chapter is presented a statement of the problem, rationale for the investigation, purpose, objectives, and hypotheses to be tested, along with definition of terms, delimitations and assumptions which underlie the study.

Chapter II contains a review of the related pertinent literature. A history of the program, sources of data, selection and description of the population, specific instruments used, summer conference training, statistical tools used, and method of analysis is reported in Chapter III. Chapter IV contains results of data collected, tests

of hypotheses, and analysis of data. A general summary, the educational implications and suggestions as to needed areas of related research of the study are contained in Chapter V.

CHAPTER II

REVIEW OF RELATED LITERATURE

In-service education has recently become one of the major concerns of the four-year college faculty, and for many of those institutions' faculty whose educational programs extend beyond the four-year level, whereas in the past in-service education for college faculty was limited mainly to junior or community colleges.

After interviewing college faculty throughout the country, Garrison¹ discerned that administrators will find it necessary to devote additional attention and resources to the content of this concern.

Literature pertaining to in-service training and education is very abundant. Literature on the process of change and innovation is growing. Literature specific to preparation of college faculty for the implementation of innovation in curriculum and instruction is almost non-existent. Therefore the review for this study was done with the following purposes in mind: (1) to explore the

¹Roger H. Garrison, Junior College Faculty: Issues and Problems. Washington, D.C.: American Association of Junior Colleges (1967), pp. 54-56.

in-service training of college faculty for the implementation of innovation in curriculum and instruction, (2) to ascertain some psychological bases for curriculum innovation, and (3) to explore teachers' attitudes and changes toward innovated curricula. The studies presented have been divided into three major subsections. The first subsection presents an exploratory review of the need for and the existence of in-service education. The second group of studies reveals some of the psychological bases for curriculum innovation and implementation. In the third, and final group of studies are revealed teachers' attitudes and changes toward innovated curricula.

The Preparation of College Faculty for the
Implementation of Innovations in
Curriculum and Instruction.

A source for achieving effective college and university teaching, according to Walker, "resides in programs of an in-service nature."²

In-service education as defined by Bessent:

is a term that can seem to include everything that happens to a teacher after he signs his first contract to teach. . . .³

²Tom L. Walter, "More Effective College Teaching," Improving College and University Teaching (Winter, 1971), p. 201.

³E. W. Bessent, "Inservice Education--A Point of View," Designs for Inservice Education (Austin: The University of Texas Printing Division, 1967), p. 4.

Corey⁴ wrote that the improvement of instruction through in-service education has been a part of the American education system for more than a century; therefore, the idea of in-service education for teachers is not novel.

Propounding the philosophy further, Richey states,

. . . No period in the past has been so poor as to have been without some qualified teachers, and no period, including the most recent, has been without some inept and poorly trained ones. . . .⁵

The nineteenth century saw in-service education as a way of overcoming the deficiencies of generally immature, poorly educated, and superficially trained teachers, wrote Corey.⁶ The program devised to most nearly correct these conditions was the teacher's institute. Richey⁷ observed that as early as 1845, there is documented evidence that in-service education was designed to instruct teachers in the way they were to instruct students.

Close to the end and immediately following the close of the nineteenth century, the institute began to give way

⁴S. M. Corey, "Introduction," in In-Service Education, the Fifty-sixth Yearbook of the National Society for the Study of Education (Chicago: University of Chicago Press, 1957), p. 36.

⁵G. H. Richey, "Growth of the Modern Conception of In-service Education," in In-Service Education, the Fifty-Sixth Yearbook of the National Society for the Study of Education (Chicago: University of Chicago Press, 1957), p. 36.

⁶Corey, op. cit., p. 2.

⁷Richey, op. cit., p. 39.

to other agencies developed for the purpose of in-service education. The agency activities included summer normal schools, extension courses, teachers' reading circles, and supervisory practices. Supervision in one form or another came to be the most common instrument for the improvement of instruction. As Richey stated:

. . . development of supervision as a function of administration, the organization of supervisory staffs, the empirical nature of professional knowledge, the generally conceded superior learning of administrators and supervisors, . . . helped shape the concept of teacher improvement as "bringing teachers up to a standard of performance contrived out of the superior knowledge of the specialist."⁸

Teaching and the classroom teacher were upgraded continuously. Large numbers of teachers were recognized as having increased expertness and capacity for self-direction. They began to demonstrate that their background, preparation, and experience had made them specialists in areas that supervision had not reached. The teacher became a specialist to be consulted.

As a specialist to be consulted, the classroom teacher plays a role which makes him an asset to in-service education. Kinneck et al.⁹ describes this role as including

⁸ Richey, op. cit., p. 50.

⁹ B. J. Kinneck, et al., "The Teachers and the In-Service Education Program," in In-Service Education, The Fifty-Sixth Yearbook of the National Society for the Study of Education (Chicago: University of Chicago Press, 1957), p. 134.

identification of problems and the formulation of plans for working on these problems. These statements are made in view of the assumption that the existence of a growing array of curriculum innovations is one of the factors which creates problems.

Greene stated,

. . . Many university teachers have had no practice teaching or even courses in pedagogical principles. In-service education assists all teachers in professional expansion. . . . In-service education helps both the novice and the experienced teacher keep abreast of increasing knowledge and developments.¹⁰

Failure to emphasize the importance of quality instruction according to McCarthy, "neutralizes efforts to encourage in-service improvement."¹¹

Eric Hoffer wrote,

. . . It is my impression that no one really likes the new. We are afraid of it. It is not only as Dostoyevsky put it that "taking a new step, uttering a new word is what people fear most." Even in slight things the experience of the new is rarely without some stirring foreboding.¹²

After relating his own feeling involving changing jobs from picking peas to picking stringbeans, Hoffer

¹⁰Robert F. Greene, "Good Teaching and In-Service Education," Improving College and University Teaching, (1971), p. 201.

¹¹Joseph L. McCarthy, "More Effective College Teaching," Improving College and University Teaching, IX (Summer 1961), pp. 124-127.

¹²Eric Hoffer, The Ordeal of Change (New York: Harper and Row, 1964), pp. 1-2.

states that even this change produced feelings of fear. He continues:

In the case of drastic change the uneasiness is of course deeper and more lasting. We can never be really prepared for that which is wholly new. We have to adjust ourselves, and every radical adjustment is a crisis in self-esteem: We undergo a test, we have to prove ourselves. It needs inordinate self-confidence to face drastic change without inner trembling.¹³

Gardner¹⁴ associates change and innovation with crises and problems, indicating that effective innovations may well increase the chances of survival of a threatened system. He notes that crises put people in the mood to accept innovation and that innovators must be alert to take advantage of such situations. He finds a close relationship between creativity, innovation, and self-renewal, and suggests that certain traits are shared by individuals possessing these characteristics. These include: openness, independence, flexibility, and capacity to find order in experience.

Similarly, openness related with tendencies to innovate and closedness with rigidity and inflexibility, according to Keuscher.¹⁵ He founded that innovative

¹³Ibid.

¹⁴John W. Gardner, Self-Renewal: The Individual and the Innovative Society (New York: Harper and Row, 1965), pp. 64-65.

¹⁵Robert E. Keuscher, "An Appraisal of Some Dimensions of Systems Theory as Indicators of the Tendency to Innovate in Selected Public Junior Colleges" (unpublished Ph.D. Dissertation, Los Angeles, University of California at Los Angeles, 1968), p. 89.

colleges exhibit close contact with environment, expressed clearly defined goals, evidence adequate planning and preparation for change, expressed clearly defined decision-making procedures, and maintained open and functioning channels of communication.

Frequently new methods or styles of teaching as well as new materials may be common with curriculum change and innovation. Certain teachers may find it more difficult than others to adapt to the changes evoked by innovation.¹⁶

Dale¹⁷ states that change is not sought by individuals or by universities. Change and innovations disturb the status quo, make waves, and may be troublesome and uncomfortable. Change involves taking risks and the possibility of failure. He cited outmoded machinery of curriculum development, lack of reward for curriculum innovation, failure to define specific course objectives, ineffective methods of evaluation, and failure in the application of ideas as reason for the lack of change in colleges and universities.

¹⁶ Steven M. Barnes, "The Reactions of Selected Elementary Teachers to the Training for and the Implementation of the Science Curriculum Improvement Study in Selected Schools in Michigan" (unpublished Ph.D. Dissertation, East Lansing, Michigan State University, 1969), p. 32.

¹⁷ Edgar Dale, "The Innovator and the Establishment," In Search of Leaders. Edited by G. K. Smith, L. Erhard, C. MacGuineas (Washington, D.C.: American Association for Higher Education, National Education Association of the United States, 1967).

Upton¹⁸ cited the necessity for strong presidential commitment to change. Accompanying that must be a faculty interest in change, which may develop out of dissatisfaction with accomplishments in higher education or in the college. Together with interest there must be commitment and involvement in inquiry. He argues for the necessity to fully grapple with the issues, indicating that a hesitant or half-hearted approach would not create an adequate climate for change. He noted that restlessness, impatience, rancor, friction, and dissention accompany change, but that time and patience would prevent the development of permanent schism within the faculty. Full involvement of faculty through the use of faculty committees and the use of outside consultants would be essential in promoting involvement; avoid ingrown characteristics, provide a stimulus to initiative and enthusiasm.

In discussing educational innovation, Miles¹⁹ proposed that emphasis ought to be directed at consideration of the process of change, why innovations spread or fail to spread, and the causes of resistance. He suggested that

¹⁸Miller Upton, "Acceptance of Major Curricular Change," In Search of Leaders. Edited by G. K. Smith, L. Erhard, C. MacGuineas (Washington, D.C.: American Association for Higher Education, National Education Association of the United States, 1967), p. 96.

¹⁹Matthew B. Miles, editor, Innovation in Education (New York: Bureau of Publications, Teachers College, Columbia University, 1964), p. 38.

special characteristics of educational systems and proposed innovations, conditions within a system which may facilitate or hinder change processes during change, characteristics of innovative persons or groups, the fate of innovation, and reasons for change in innovation rates are kinds of questions which anyone interested in the study of educational innovation must understand.

Johnson²⁰ reported that colleges and universities resist change rather than subject themselves to the upheavals of innovation. Hopefully, he noted that planned changes are being made and that the junior college gives promise of being a leader in innovative developments. This he stated may be due to the rapid growth of junior colleges and relative lack of long-established tradition which encourages change. Pressures to keep up with increasing demands of expansion, together with the demands of senior college and university requirements, lack of administrative support, and poor communication can retard innovation and experimentation. The author emphasized that innovation is facilitated by providing financial assistance, involving those affected by change in its planning, encouraging creativity by faculty in devising new approaches to teaching, and allowing faculty the right to fail.

²⁰ Lamar B. Johnson, Islands of Innovation Expanding: Changes in the Community College (Beverly Hills, California, MacMillan Company, 1969), p. 29.

Messell²¹ attributes most innovation to outside sources; however, he also states:

I believe that innovation that is generation within the institution by faculty members themselves, is likely to be more significant in its effect, better tested, and longer-lasting than change that is imposed from without.

He cited a committee on innovation and experimentation, involvement of students, adequate financial resources, and improved assessment techniques as of value to innovation efforts.

Maintaining a high rate of production of good and new ideas, examining and evaluating proposed innovations prior to adoption or rejection, wise allocation of available resources, and institutionalizing the process of change, according to Adelson raise the likelihood of adoption of innovations.²²

Cooper²³ concluded that complacency on the part of faculty, inadequate financial incentives, and the fatigue

²¹Nils Messell, "The Process of Innovation," in Improving College and University Teaching, edited by Calvin B. T. Lee, (Washington, D.C.: American Council on Education, 1968), p. 205.

²²Marvin Adelson, "Educational Ends and Innovational Means," Inventing Education for the Future. Edited by Merner Hirsch (San Francisco: Chandler Publishing Company, 1967), pp. 78-79.

²³Russell M. Cooper, "Faculty Development Programs," In Search of Leaders. Edited by G. K. Smith, L. Erhard, C. MaGuineas (Washington, D.C.: American Association for Higher Education, National Education Association of the United States, 1967), p. 74.

of young faculty as factors which delay advances toward more effective instruction in higher education. He related faculty involvement, improved methods of appraisal, administrative support, and inter-institutional cooperation as contributing to faculty improvement.

Gusfield,²⁴ in his discussion of factors having implication for change and innovation in higher education, contended that students will become effective change agents and that the ideology of change would come more from students than from administrators, and more from administrators than from faculty.

Regardless of the efficiency of any particular method for improving college and university teaching, the need, according to Eurich, is that each institution make a positive commitment to innovation in teaching and establish a program of research and development in the art of teaching.²⁵

²⁴Joseph Gusfield, "The Faculty Institute," paper presented at Workshop Conference to Foster Innovation in Higher Education, Union for Research and Experimentation in Higher Education, April 25-29, 1967.

²⁵Alvin C. Eurich, "The Commitment to Experiment and Innovate in College Teaching," Educational Record, XXXXV (Winter 1964), pp. 49-55.

Some Rationales and Psychological Bases for
In-Service Education in Curriculum
Innovation and Implementation

The rationale for faculty in-service education programs in the innovative institutions of higher education is related to the belief that faculty members ought to be provided an opportunity to become involved and have some input into ongoing "new" ways of doing things. It is legitimate to expect that faculty would wish to know the college's position on innovation, the measure the college takes to encourage and facilitate the process, conditions which may mitigate their efforts, and the opportunities and provisions for professional growth.

The concerns expressed by faculty in Garrison's study are echoed by a large number of new faculty who participated in a study conducted by the American Association of Junior Colleges. The major problems these faculty identified, ranked in order of their frequency, difficulty, and persistence are:

(1) lack of time for scholarly study, (2) adapting instruction to individual differences, (3) dealing with students who require special attention to overcome deficiencies, (4) acquiring adequate secretarial help, (5) understanding college policies regarding teaching load, (6) challenging superior students, (7) obtaining needed instructional materials, (8) grading or marking students' work, and (9) understanding college policies to be followed in curriculum development and revision.²⁶

²⁶ Roger H. Garrison, Junior College Faculty: Issues and Problems (Washington, D.C.: American Association of Junior Colleges, 1967), p. 26.

Schmidt,²⁷ addressing community college nursing program administrators, contends that effective in-service programs and opportunities for personal and professional growth contribute to retaining faculty, and that administrators have a responsibility of devising ways and means to interest and assist faculty members in the improvement of conditions for students learning and their own teaching. She continues:

There must be a plan for this working together of the faculty, it cannot be left to chance. Regularly scheduled, frequent faculty meetings to work on curriculum development are essential. Workshops for the department faculty before and at the end of the school year can be highly effective. A climate which permits faculty to introduce new ideas, try them out, admit either failure or success and proceed to revise their ideas for the next class will be rewarding and challenging to those involved.²⁸

The concern for human relations, attention to the process of change and its effects on faculty involved are crucial to the implementation of innovative practices. Johnson noted that: "drastic and rapid change make effective human relations more essential at the same time that they become more complex and difficult."²⁹

²⁷ Mildred Schmidt, Obtaining and Keeping Faculty in an Associate Degree Nursing Program, a paper presented at the fifth meeting of the Southern Regional Education Board Council on Collegiate Education for Nursing, October 21, 1965, Atlanta, Georgia.

²⁸ Ibid., p. 27.

²⁹ Johnson, op. cit., pp. 13-14.

Matson³⁰ regretted the efforts of some to introduce innovations in higher education which emphasized the rational considerations but ignored the emotional factors, dynamics of change, and human behavior involved in the process.

Likewise, Asher³¹ placed considerable emphasis on individual and group interactions, the problem-solving process, and communication.

In a previous paper, the writer raised a question regarding the nature of change and innovation which made participation so important.

Carpenter and Greenhill³² suggested that new media should stimulate students, represent reality, enable teachers to vary their patterns of instruction, and span time, space, and culture. New media require teachers to modify the traditional teaching relationship where the principal interaction is between the student and teacher.

³⁰Goodwin Watson, "Innovation: Processes, Practices and Research," in Innovations in Higher Education: Developments, Research and Priorities, edited by Samuel Baskin, New Dimensions in Higher Education, monograph 19, (Durham, N.C.: Duke University and U.S. Office of Education, 1967), p. 40.

³¹James J. Asher, "Inservice Education--Psychological Perspectives" (Berkeley, California: Far West Laboratory for Educational Research and Development, 1967).

³²C. R. Carpenter and T. M. Greenhill, "The New Media," in Higher Education, Some Newer Developments, Samuel Baskin, editor (New York: McGraw-Hill Book Company, 1967), p. 6.

This may be in error and the principal interaction or transaction should be between the learner and the materials to be learned.

The writers placed considerable emphasis on well-prepared faculty with continuous training. Conditions favorable to the successful introduction of new media, cautions for its use, and urged research were also suggested.

Cogen³³ declared that if teachers are to be effective as agents of change they must be encouraged to experiment with methods and materials, participate in curriculum planning, attend educational conferences, and be given time to plan creative activities. Teachers should be elevated to positions of shared authority and be given better in-service training.

He cited the importance of having universities stress innovation, evaluation, and research as well as improving subject matter and methods courses, in an effort to assist students in accepting innovation and improving the overall quality of teachers.

Westly³⁴ discussed the implication of change for in-service education. She suggested that in-service

³³Charles Cogen, "The Teacher and Educational Change," in Inverting Education for the Future, edited by Merner Hersch (San Francisco: Chandler Publishing Company, 1967), p. 6.

³⁴Dorothy Westly, "Inservice Education--Perspectives for Education," Berkeley, Far West Laboratory for Educational Research and Review, 1967.

education programs should have defined objectives, focus on interested teachers, include visits to innovative centers, involve teachers in planning and evaluation of the innovations and in-service programs. Recommendations were made to the effect if innovation was a caste problem, accompanied by appropriate preparation, then adoption should be on a step by step basis.

Garrison³⁵ reported a widespread concern of faculty for their own professional refreshment and upgrading. Faculty cited the need for carefully planned and led in-service education programs. They recommend that such programs utilize the resources of the college and outside consultants, and should be more than causal or perfunctory business sessions. Faculty agreed that the dean of instruction or his equivalent should be given the responsibility for the programs.

Gardner and Sanford made statements which appear to summarize the rationales for in-service education in curriculum innovation and implementation. Gardner stated:

Since we cannot really know what kinds of changes will prove useful, we must experiment. Or to put it more realistically, those of us who are temperamentally fitted for it must experiment, and the rest of us must tolerate it, even encourage it . . . A system that isn't innovating is a system that is dying. In the long run, the innovators are the ones who rescue all

³⁵ Roger H. Garrison, Junior College Faculty: Issues and Problems (Washington, D.C.: American Association of Junior Colleges, 1967), pp. 81-82.

human ventures from death by decay. So value them. You don't have to be one yourself, but you should be a friend of the innovators around you. And if you don't have any around you, you had better import some.³⁶

Sanford stated:

Developmental change can occur at any time of life. All of us, at whatever age, have potentialities that have not yet been led forth. What actually happens depends on conditions--conditions that can, to some extent at least, be controlled. Developmental changes take place when there is a challenge--of such a nature or intensity that the individual cannot manage by behaving just as he did before but must evolve new ways of responding. The challenge must not, however, be too severe--beyond the adoptive capacities of the individual--for in that case there will be a falling back upon primitive modes of adaptation.³⁷

Perhaps in-service education programs provide those controlled challenges and conditions. Sanford continues:

It follows from this (the support, degree to which it influenced or was imitated by or became a model for others) that the benefits of educational experimentation may lie not so much in what can be found out from it as in the effects that it has on those who take part in it. Almost always an educational experiment interests and challenges the students who are its objects--they are touched by these signs of interest in them--and they respond by performing well and showing various signs of desirable change. And so with teachers who carry out experimental programs. Their desire to see these programs succeed leads to extra effort on their part and, most important, to a fresh interest in students; this makes them better teachers, and the students respond by behaving as the designers of the experiment predicted. Thus it is that processes which make scientific work in this field extraordinarily

³⁶John W. Gardner, No Easy Victories (New York: Harper and Row, 1968), p. 49.

³⁷Nevitt Sanford, "Implications for Education and for Adjustment of Curricula to Individual Students," in Universal Higher Education, edited by Earl J. McGrath (New York: McGraw-Hill Book Company, 1966), p. 63.

difficult are the very ones that lead to immediate educational gains.³⁸

Curriculum innovations reflect a change in philosophical orientation as well as a change in approach to instruction according to Butts.³⁹

Brawer⁴⁰ in discussing innovation and the individual, identifies the necessity to know who will accept or regret change, the conditions which existed before changes were implemented, and how the results of change may be evaluated. She suggested that teachers should be trained to recognize and develop creativity, be innovative in themselves, and be given freedom to experiment and express their creativity. Conditions which promote creative behavior and the development of innovative ideas are not well formulated.

Caffey and Galden⁴¹ emphasized the interaction process. They state that in order for significant changes

³⁸Ibid., p. 53.

³⁹D. P. Butts, "The Classroom Experience Model," in Design for Inservice Education, edited by E. W. Bessent, Research and Development Center for Teacher Education, The University of Texas, Austin.

⁴⁰Florence B. Brawer, Personality Characteristics of College and University Faculty: Implications for the Community College (Washington, D.C.: American Association of Junior Colleges, 1968).

⁴¹H. S. Caffey and W. P. Galden, "Psychology of Change within an Institution," in In-Service Education, the Fifty-sixth Yearbook of the National Society for the Study of Education (Chicago: University of Chicago Press, 1957), pp. 75-76.

to take place certain types of relationships must exist which are "participative and collaborative" in addition to "two-way communication."

This statement seems to establish justification for in-service education with groups faced with the responsibility of implementing programs inherent with change.

Bessent stated that:

In-service education is aimed at individuals through group activities and takes place in the organizational context in which the individuals carry out their tasks.⁴²

In addition Bessent proposed three admonitions for those who plan in-service programs and they are:

1. Thou shalt not commit in-service programs unrelated to the genuine needs of staff participants.
2. Thou shalt not kill interest through in-service activities inappropriate to the purpose of the program.
3. Thou shalt not commit in-service on a shoestring.

Research has reported specific techniques used for in-service where curriculum innovation has necessitated change.⁴³

The laboratory approach, according to McIntyre, is an instructional system of procedure, a strategy for accomplishing certain learning ends. This approach attempts to make use of that which is known about the way people

⁴²E. W. Bessent, "In-service Education: A Point of View," Designs for In-Service Education (Austin: The University of Texas Printing Division, 1967), p. 5.

⁴³Ibid., p. 8.

learn. For example, the rationale for the laboratory approach includes the idea that,

. . . people learn better when they are actively involved in the learning process--when they do something rather than have something done to them.⁴⁴

Harris proposed demonstration as a technique for in-service education demonstrations to be used to bridge the gap between firsthand experience and just hearing about things. In defining demonstration, he perceived it as "a compromise between the need for realistic experience and the disadvantages accompanying firsthand experience."⁴⁵

A third technique for in-service education has been called the classroom experience model. According to Butts, the rationale for this technique relies heavily on the belief that,

Teachers are not likely to be interested in change if they have no knowledge of either the change or its potential.⁴⁶

According to Butts, three assumptions comprise the rationale for the classroom experience model which is

⁴⁴K. E. McIntyre, "The Laboratory Approach," Designs for In-Service Education (Austin: The University of Texas Printing Division, 1967), p. 17.

⁴⁵B. M. Harris, "Teaching Demonstration Model," Designs for In-service Education (Austin: The University of Texas Printing Division, 1967), p. 41.

⁴⁶D. P. Butts, "The Classroom Experience Model," in Design for In-Service Education (Austin: The University of Texas Printing Division, 1967), p. 36.

the in-service training program for elementary teachers using the innovative science program developed by the Commission on Science Education of the American Association for the Advancement of Science.

The three assumptions are:

1. that knowledge of the innovation precedes and is essential to its implementation.
2. that commitment to the use of the innovative materials is essential to acceptance of the innovation.
3. that guidance in the use of the innovation is essential to its implementation.⁴⁷

Brickell, in discussing the introduction of change in schools, stated that the process may arouse feelings of insecurity and inadequacy which should be distinguished from outright resistance to change. He proposed that:

the most successful innovations are those which are accompanied by the most elaborate help to teachers as they begin to provide the new instruction.⁴⁸

Underlining the importance of preparation is Brickell's contention that the real source of rigidity is the ill-prepared, ill-informed, and ill-equipped teacher.⁴⁹

McCormick stated that due to the impact of instructional technology on higher education is becoming more and more pronounced as a spirit of innovation continues to

⁴⁷Ibid., p. 38.

⁴⁸Henry M. Brickell, Organizing New York State for Educational Change (Albany: State Education Department, 1961).

⁴⁹Ibid.

emerge. Innovation, representing purposeful change based upon experimental or empirical evidence of immediate or potential value, will continue to appear in the colleges and universities only as it is accepted by the professors as an integral part of the communicative process of higher education.⁵⁰

Teachers' Attitudes Toward Curriculum Changes

Implementing curriculum change requires a careful analysis of those factors which affect its use. The most important block to innovation is the attitude of teachers as was described by Noda when he noted that the important block to curriculum change arises out of the attitude of teachers and their relationship to other teachers and administrators.⁵¹

Osgood conceptualizes attitudes as being,

. . . how a person behaves in a situation depends upon what that situation means to him. . . . One of the most important factors in social activity is meaning and change in meaning--whether it be termed "attitude," or "value," or something else again.⁵²

⁵⁰Frank L. McCormick, "Instructional Methodology," Improving College and University Teaching.

⁵¹Daniel S. Noda, "A Study of Successful Practice Used to Remove the Major Blocks to Curriculum Improvement in the Secondary School," unpublished Doctoral Dissertation, The Ohio State University, 1952, p. 78.

⁵²C. E. Osgood, G. J. Suci and P. H. Tannenbaum, The Measurement of Meaning (Urbana: University of Illinois Press, 1957).

According to the learning theorists attitudes mediate perceptions and these perceptions determine the meaning of feedback from the environment.⁵³ Feedback function purposely to guide intelligent direction of future actions.⁵⁴

Then it would seem appropriate for those who are concerned with changing teachers' behavior should focus attention simultaneously upon their attitudes and attitude changes.

Butts and Willson observed when teachers were involved in an innovative curriculum workshop, teachers did not demonstrate the same degree of change.⁵⁵

A previous study by Butts and Raun, was concerned with the type of teacher with whom a teacher education program can expect to produce the greatest change in the perception of innovation as well as practice.

Their study involved 60 elementary teachers from the Austin Independent School District and seven adjoining

⁵³Winfred Hill, Learning (San Francisco: Chandler Publishing Company, 1963).

⁵⁴Norbert Miener, Cybernetics (New York: John Wiley and Sons, 1948).

⁵⁵David P. Butts, "The Classroom Experience Model," in Design for In-Service Education, edited by E. W. Bessent, Research and Development Center for Teacher Education, The University of Texas, Austin, 1967. S. C. Willson, "Teacher Education Through an Inservice Program," unpublished Master's Thesis, The University of Texas, Austin, 1967.

school districts. Teaching experience ranged from 0 to 34 years with a median of 7.75 years. Their course work in science varied from 0 to 30 hours with median of 11.5 hours. Grade levels were 1 through 6.

The result of their findings indicated grade level made a relevant contribution to a positive change in attitude. Previous course hours in science was also a relevant contributor to a more positive attitude for those teachers who had few or no previous hours in science. Previous teaching experience and the location of the school where the teachers taught did not appear to be relevant contributors to attitude change.⁵⁶

Change is often perceived by individuals as a threat to their security, status, or challenge to their competence and involving a degree of uncertainty. For these reasons, they resist change. These reactions can, to a degree, be overcome by making certain that change is indicated, that there is careful planning of change, that the reasons for change are communicated to those affected, and probably most important, involving those affected in the entire process.⁵⁷

⁵⁶David P. Butts and Chester E. Raun, A Study of Teacher Change, Science Inservice Project, Research Report, No. 1, The Science Education Center, The University of Texas, Austin, 1967.

⁵⁷Mary E. Jensen, "The Role of Administrators in Facilitating Innovation in Community College," unpublished seminar paper, Los Angeles, University of California at Los Angeles, 1968.

Butts and Raun gave three factors which purport to enhance the desirability of change in teachers:

1. he becomes familiar with the innovation.
2. he acquires experience so he knows what to expect from students' responses, and
3. he gains self-confidence in working with curriculum innovation.⁵⁸

It is not readily discernible, due to the complexity of human behavior, to determine whether a teacher education program results in observable changes in a teacher's perception of a curriculum innovation and his or her subsequent practice of that innovation. Ryans described this when he said:

Successful teaching, as well as successful participation in most of the professional activities, is contributed to by many qualities of individual, intellectual and personal.⁵⁹

Since teaching includes specific subject matter, the individual past preparation in a subject matter area might logically determine the impact of an in-service program. Ryans⁶⁰ found special subject matter knowledge to be

⁵⁸Butts and Raun, op. cit.

⁵⁹David G. Ryans, Measuring the Intellectual and Cultural Backgrounds of Teaching Candidates; Analysis of the Results of Second Annual Administration of the National Teacher Examination, Cooperative Test Service of the American Council on Education, New York, 1941, pp. 1-28.

⁶⁰Ibid.

positively correlated with teaching effectiveness. Ellena,⁶¹ however, found that subject matter competence was not a major factor in the quality of teaching performance. In an earlier study Ryans⁶² reported that the amount of college training appeared to make little difference in effective teaching behavior.

A second major component of the teacher education program is the involvement of the teacher with students. In curriculum innovation, the focus of attention is on the student and how he learns. Thus the more teaching experience a teacher has, the more likely he would benefit from a teacher innovative education program that emphasizes perceptiveness of student responses. However, the contribution of past teaching experience to changing teaching behavior is not clear.

Taylor's study of the relationships between growth of interest and achievement of high school science students and science teacher attitudes, preparation, and experience involved 28 Texas public school systems and 83 science teachers. The comparison of student gains with teacher factors such as attitude, background in professional

⁶¹W. J. Ellena, Who's A Good Teacher? (Washington, D.C.: National School Boards Association, 1961).

⁶²David G. Ryans, "A Study of the Extent of Association of Certified Professional and Personal Data with Judged Effectiveness of Teacher Behavior," Journal of Experimental Education, 1951, 20:67-77.

education, background in science, and teaching experience. According to his findings, there were no significant differences.⁶³

In a very early study Knight⁶⁴ analyzed the contribution of age, experience, and I.Q. to success in teaching. He concluded that none of these factors are closely related to successful teaching.

Shortly after, Bathurst⁶⁵ showed that teacher efficiency increased slightly with experience, but the increase was so slight as to be insignificant. In more recent times, however, Ryans⁶⁶ did show an over-all negative relationship between the amount of teaching experience and teaching effectiveness. He also found evidence of an increase in effectiveness with the early years. This find seems to be supported by that of Ellena⁶⁷ who concluded

⁶³Thomas W. Taylor, "A Study to Determine the Relationships Between Growth in Interest and Achievement of High School Science Students and Teacher Attitudes, Preparation, and Experience," (Unpublished Doctoral Dissertation, North Texas State University, 1957), p. 77.

⁶⁴F. B. Knight, Qualities Related to Success in Teaching, Columbia University contribution to Education, No. 120, 1922.

⁶⁵J. E. Bathurst, "Relation of Efficiency to Experience and Age Among Elementary Teachers," Journal of Educational Research, 1929, 19:314-316.

⁶⁶David G. Ryans, Prediction of Teacher Effectiveness, Encyclopedia Educational Research (The MacMillan Company, New York, 1960), 1486-1591.

⁶⁷Ellena, op. cit.,

that teaching effectiveness seems to rise rapidly in the first years of teaching and level off at a fairly stable plateau. Years of experience may be another key contributor to securing change.

Willower and Jones⁶⁸ found that more experienced teachers generally held conservative views, while less experienced teachers were more liberal and permissive. The more experienced teachers dominated the informal structure of school and did not hesitate to communicate their point of view to less experienced teachers. They favored the status quo and opposed changes that were likely to result in a more permissive procedure.

Butts and Raun⁶⁹ studied four factors as contributors to the perception of innovation in their attempt to determine what type of innovated education program would produce the greatest change in both the perception of innovation and the practice of innovation. The sample studied included 19 teachers of predominately middle class Anglo. The years of teaching experience of the group varied from 0 to 34 years with a mean of 11.2 years. The previous

⁶⁸D. G. Willower and Donald G. Jones, "When Pupil Control Becomes an Institutional Theme," Phi Delta Kappa, 1963, 45:107-109.

⁶⁹David P. Butts and Chester E. Raun, A Study in Teacher Change, Science Inservice Project, Research Report, No. 1, The Science Education Center, The University of Texas, Austin, 1967.

preparation in science varied from 0 to 30 semester hours with a mean of 13.6 hours. The four factors were: (1) competency in science, (2) previous hours in science, (3) previous teaching experience, and (4) grade level taught.

The results of the study indicated the greatest change in the perception of the innovation were with those teachers who had a number of years of teaching experience but who had few hours of previous science courses. Further analysis indicated that the competency in science of a teacher affected change in the teacher's practice of curriculum innovation.

White, Raun and Butts⁷⁰ made conclusions as a result of their study to determine what conditions affected the impact of an innovated teacher education program when its impact was described in terms of competency in science and attitude toward curriculum innovation. Their findings indicated that the organization and location of the innovative teacher education program were relevant factors. Improvement in both competence in science and teacher attitude appeared favorable to the released-time format of teacher training. Previous science courses

⁷⁰Marjorie A. White, Chester E. Raun, and David P. Butts, A Study of Contrasting Patterns in Inservice Education, Science Inservice Project, Research Report, No. 3, The Science Education Center, The University of Texas, Austin, 1968.

appeared to have been a relevant condition for increased competence in science. Previous teaching experience and grade level taught did not appear to be related to competence in science but did appear to be related to a teacher's attitude.

Clinton and House made a study to determine a set of attributes of innovations and also to explore the extent to which these attributes have general utility in accounting for acceptance of innovations. As a result of their findings, the conclusions reached were: "attributes accruing to innovations are perhaps as relevant to implementation of innovations as are external factors--how a teacher perceives a new idea or thing being as important as the thing or idea itself."⁷¹

Summary

Studies relevant to the preparation of college faculty for the implementation and innovation in curriculum and instruction pointed up many divergent opinions; however, many lines of general agreements could be concluded. Therefore, the conclusions presented are drawn from each of the three areas reviewed.

⁷¹ Alfred Clinton and John H. House, "Attributes of Innovation as Factors in Diffusion," paper presented at American Education Research Association Meeting, Minneapolis, March 1970.

1. The purpose and function of in-service education beginning around the eighteenth century to about the close of the nineteenth century, involved changing from a way of overcoming deficiencies of a general educational nature to assume a more diverse role, that of training of supervisors, specialists, and consultants. Their primary functions were to identify problems and to formulate plans to attack problems in education according to Kinneck et al. (9)* with the assumption that curriculum innovations created problems.

A method for improving faculty instruction could be accomplished through in-service education as supported by studies of Walker (2), Corey (4), Richey (5), Greene (10), and McCarthy (11). In offering explanations for why many institutions of higher learning and faculties failed to become involved in curriculum innovations or changes varied, but some trends of agreement could be discernible. Curriculum innovation and changes often initiate new methods or styles of teaching as well as new materials along with fear and anxiety, a feel of threat and insecurity. These explanations are in part supported by Hoffer (12) and (13), Dale (17), and Johnson (20). Cooper (23) gave reasons such as complacency on the part of faculty, inadequate financial

*The number in parentheses refers to previously cited references.

incentives and fatigueness on the part of young faculty as factors which delay advancement toward more effective instructions in higher education.

In a study of characteristics as traits associated with changes and innovations, Gardner (14) found a close relationship between creativity, innovation and self-renewal, and individuals possessing these characteristics exhibited certain other traits such as openness, independence, flexibility and the capacity to find order in experience. Similarly, Keuscher (15) related openness with tendencies to innovate and closedness with rigidity and inflexibility. He found that innovative colleges exhibited close contact with environment, expressed clearly defined goals, evidence adequate planning and preparation for change, expressed clearly-defined decision-making procedures, and maintained open and functioning channels of communication.

In discussing factors having implication for change and innovation in higher education, Upton (18) cited the necessity for strong presidential commitment along with faculty interest. Similarly, Messell (21) attributed most innovations to outside sources, but he believed innovations that was generated by faculty members within a given institution would be more significant, more effective, and longer-lasting than when changes were imposed from without. Miles (19) proposed that emphasis should be placed on the process change itself. Johnson (20) found that colleges and

universities exhibited resistance to change and innovation, but however, noted promising leads among junior colleges. Gusfield contended that students would become effective change agents and the ideology of change would come from students more than from administrators, and more from administrators than from faculty, and according to Eurich (25) each institution should make a commitment to innovation in teaching and establishment of programs for this purpose.

2. The several rationales presented in this portion of the chapter seem to have indicated the most discernible is that of faculty concern for becoming involved in curriculum innovations. Those concerns were expressed in a study done by Garrison (26) for the American Association of Junior Colleges. Schmidt's (27) address to a group of community college nursing program administrators, expressed her concerns for providing opportunities for the personal and professional growth of faculty members. Also in the previous report by Garrison (35) similarly concerns were expressed by faculty members.

Johnson (29) noted that human relation was essential in making drastic and rapid changes in curriculum. Watson (30), Asher (31), Carpenter and Greenhill (32), Caffey and Galden (41) all emphasized psychological factors such as human behavior, and group interaction as being very important in the change process. Reports by Cogen (33), Gardner (36), Sanford (37), and Brawer (40) all pointed out

the fact that certain opportunities provided the innovator, such as experimentation and creativity, had important psychological bearings on the outcome of a successful curriculum innovation and implementation.

Butts (39) in discussing his classroom experience model, concluded how successful a curriculum innovation was dependent to a great degree on a change in philosophy concerning curriculum innovation and implementation.

3. Research finding involving teachers' attitudes toward curriculum innovations was reported by Noda (51). He noted that the most important block to curriculum change arose out of the attitude of teachers and their relationship to other teachers and administrators. Butts and Wilson (55) studied concerning the type of teachers that could best be expected to produce the greatest change through a teacher education program in terms of perceptions and practices of an innovation. Their study involved 60 elementary school teachers. Their finding indicated grade level and previous course hours in science contributed a positive change in attitude for those teachers who had few or no previous hours in science. Previous teaching experience and the location of the school where the teachers taught did not appear to be relevant to attitudinal change. Ryans (60) found special subject matter knowledge to be positively correlated with teaching effectiveness, however, Ellena (61) found that subject matter competence was not a major factor in the

quality of teaching performance. Taylor's (63) study of the relationships between growth of interest and achievement of high school science students and science teacher attitudes, preparation, and experience involved 28 Texas public school systems and 83 science teachers. In a comparison of student gains with teacher factors such as attitude, background in professional education, background in science and teaching experience, no significant differences were found. In an early study, Knight (64) analyzed the contribution of age, experience, and I.Q. to success in teaching. He concluded that none of those factors were closely related to successful teaching. In a study done by Bathurst (65) shortly thereafter, indicated teacher efficiency increased slightly with experience, but the increase was so slight as to be insignificant. In a more recent study by Ryans (66) findings indicated an over-all negative relationship between the amount of teaching experience and teaching effectiveness. In this same study evidence indicated that an increase in effectiveness with early teaching years. This finding seems to support that of Ellena (67) who concluded that teaching effectiveness seems to rise rapidly in the first few years of teaching and leveled off at a fairly stable plateau.

Willower and Jones (68) findings indicated that the more experienced teachers generally held conservative views,

while less experienced teachers were more liberal and permissive.

In studying four factors as contributors to the perception of innovation, Butts and Raun (69) in an attempt to determine what type of innovated education program would produce the greatest change in perception and practice of innovation among 19 teachers of predominately middle class Anglo background. The four factors investigated were: (1) competency in science, (2) previous hours in science, (3) previous teaching experience, and (4) grade level taught. Their findings indicated that teachers who had few hours of formal science training and a number of years of teaching experience showed the greatest change in the perception of innovation. Further analysis of the same study indicated that teachers' competency in science affected change in the teacher's practice of curriculum innovation. White, Raun and Butts (70) made conclusions from their study to determine what conditions affected the impact of an innovated teacher education program when the impact was described in terms of competency in science and attitude toward curriculum innovation. Their findings indicated that organization and location of the innovated teacher education program were relevant factors. Further indications were previous science training increased science competence. However, previous teaching experience and grade level taught did not appear to be related to science competence but did appear to be related to teacher's attitude.

CHAPTER III

DESCRIPTIVE FEATURES OF THE STUDY

Presented in this chapter are: (1) the general objectives and design of the Thirteen-College Curriculum Program under which this study was carried out, (2) a background description of the program, (3) the development of the biological science curriculum, (4) the development of the physical science curriculum, (5) a description of the Summer Workshop, (6) a description of participants and the methods used to assign them to the program, (7) the procedures for collection of data, and (8) the procedures for analysis of data.

General Objectives and Design of the Thirteen-College Curriculum Program

The study was designed to investigate teachers' attitudes and attitude changes toward the TCCP in science as was carried out in conjunction with the institute for Services to Education. This study began in the summer of 1971 and extended for one term (quarter or semester) of the 1971-1972 school year.

General Program Objectives

The general objectives for the TCCP program fall into three areas: (1) changes in institutional goals, (2) changes in teacher objectives, and (3) changes in student objectives. In each instance the institutions, the teachers, and the students will change if the program is successful; these changes are specified below:

Institutional Objectives

1. To generate interest in curriculum reform on the campuses and to influence changes in the total curriculum of the colleges.
2. To demonstrate the possibility of a reduction in attrition rate, particularly in the first two years of college.
3. To have a group of students enter their junior year with a level of academic preparation and positive attitudes toward learning that will improve the quality of work they do in their academic majors.

Teacher Objectives

1. To increase skill in the development of new curriculum materials.
2. To broaden, and in some cases change or modify, instructional techniques or approaches to the presentation of material in the classroom.

3. To foster an attitude about the inadequate performance of students which leads to experimentation with materials and teaching improvement rather than complaints about student weaknesses.

4. To develop some leadership for curriculum reform on each campus from among the teachers in this program.

Student Objectives

1. To develop facility in the analysis and interpretation of qualitative and quantitative data from a variety of disciplines.

2. To develop a critical, skeptical, and questioning attitude toward all sources of information, i.e., from authorities, from teachers, from the printed page.

3. To move students toward initiating their own learning activities over material which goes beyond or differs from that assigned in classes.

4. To have a high volume of verbal participation of students in classroom sessions based on an adequate knowledge of the topics under study.

5. To have the students capable of demonstrating, at the end of the freshman year, knowledge and skills in the four fields that will be acknowledged by their peers and their teachers as equal to or superior to those of the study's regular freshmen.

The vehicle to be used in achieving these broad-based objectives was an active consortium for curriculum development and institutional change which became known as the Thirteen-College Curriculum Program (TCCP) in 1967.

Background of the Thirteen-College Curriculum Program

In the fall of 1966 thirteen colleges in eleven states decided to form a consortium so that they might better avail themselves of resources needed to improve instruction in their institutions at the freshman and sophomore levels. The project began as a cooperative venture involving, in addition to the thirteen colleges, the Institute for Services to Education.

The Institute for Services to Education was incorporated as a non-profit organization in 1965 and received a basic grant for the Carnegie Corporation of New York. The organization is founded on the principle that education today requires a fresh examination of what is worth teaching and how to teach it. ISE undertakes a variety of educational tasks, working cooperatively with other educational institutions, under grants from government agencies and private foundations. ISE is a catalyst for change. It does not just produce educational materials or techniques that are innovations; it develops, in cooperation with teachers and administrators, procedures for

effective implementation of successful materials and techniques in the colleges.

The Institute for Services to Education, which includes an academic staff called the Curriculum Resources Group, serves as a catalyst and a unifying force in moving separate institutions and separate funding agencies toward similar goals within a common framework. The professional staff consists of 16 people whose backgrounds and experiences are in academic scholarship, educational invention, and educational evaluation. The educational ideas in the program are further developments of those coming out of ISE's earlier work in developing innovative materials for pre-college programs for high school students attending predominantly black colleges.

From 1967 to the present, ISE has been working cooperatively with the Thirteen-College consortium in developing the Thirteen-College Curriculum Program. The curriculum staff is assisted in the generation of new educational ideas and teaching strategies by teachers in the participating colleges and outside consultants. Each curriculum area has its own advisory committee, with members drawn from distinguished scholars in the field but outside of the program.

With the aid of a grant from the National Science Foundation, the Curriculum Resources Group of the Institute for Services to Education sponsored the first of a series

of annual summer curriculum conferences for the teachers of the Thirteen-College Curriculum Program. At this time there was a feeling among the member institutions that they could turn out better students, students more able to meet the competition for jobs and thus survival. There has been a gap between the actual academic attainment of many high school graduates, especially those from rural areas, and the expected levels for such graduates; this gap is a tradition. The black college in particular has for decades found that it has had to engage in "gap-closing" activities in order to produce college graduates who could continue to meet the competition for jobs. Of course, as in any human endeavor, they were not able to achieve this 100 percent, nor did they feel that they were going about it in 100 percent the right way. It was a period, too, when the civil rights movement was spurring integration, including more widespread integration of public elementary and secondary schools as well as colleges in the south. The future of black colleges was being weighed, perhaps even without their permission. Some colleges realized that it would be very desirable to improve the quality of their graduates.

At the same time, although it may not have been admittedly a very direct cause, there was an increasing demand heard from students in colleges all over America. As the 1960's dawned, the "silent generation" became a

militant generation with confrontation politics its usual tool instead of debates in impotent student councils. Although there was only a vocal minority of students voicing protestations about teaching practices in American colleges, including the predominantly black colleges, their points of view were apparently shared by the great "silent majority" of other students. These students were not content just to sit and listen to the opinions of their teachers nor to the recitation of facts without the opportunity to ask questions about the application and relevance of points of view to their lives. There was an increasing restlessness about administrative procedures as well and a growing insistence that the student be allowed to have a larger voice in the formulation of his educational plans. The Thirteen-College Curriculum Program in part represents a response to and recognition of the legitimacy of student protestations as well as the recognition by the colleges that the materials and methods of teaching this generation of students would represent an almost radical departure from the traditional means and aims of higher education in the United States. Furthermore, students in predominantly black colleges were being faced with increasing competition for the jobs available to college graduates. A growing national population, a rapidly expanding technology, the burgeoning of the value of the gross national product, and other factors, indicated that the quality of

education of the black college graduate had to be improved in order for these young people to gain and keep the jobs that mean economic survival.

Being knowledgeable of these conditions and events, the Thirteen-College Curriculum Program began to outline objectives to mediate some of the educational problems of predominantly black college students.

Growth of the Program

In 1967, thirteen colleges introduced the program to their campuses. The colleges and universities were:

Alabama A. & M. College	Lincoln University
Bennett College	Talladega College
Bishop College	Jackson State College
Clark College	Tennessee State University
Florida A. & M. University	Southern University
Norfolk State College	Voorhees College
North Carolina A. & T. State University	

Each of the colleges had a program staff consisting of one director, one counselor, and eight teachers (two for each of the four first year curriculum areas) with the exception of Bennett College, which had a program staff composed of one director, one counselor, and four teachers (one for each of the four first-year areas). Each college's program served one hundred students, with the exception of Bennett College which enrolled fifty students.

In the second year, 1968, the sophomore courses, humanities and philosophy, were added to the program. The

program staff of each college (Bennett was again excepted) was enlarged to fourteen persons, by the addition of two teachers, one for the humanities and one for the philosophy courses. Each program's student enrollment increased to two hundred students; one hundred students in the freshman courses and one hundred students in the sophomore courses.

In this same year, Mary Holmes Junior College became the fourteenth college to join the program. In the years 1969 and 1970, as the result of the program (reported elsewhere in this report) and the program itself became more widely known, the initial colleges began to implement the program. Greater numbers of freshmen students were permitted to enroll in the program's courses and a greater number of the college faculty were oriented to the program and began to utilize the teaching style of the program as well as its materials. Concomitantly, more colleges and universities became interested in the program and adopted it.

In 1970, five colleges and universities, in the form of the Five College Consortium, adopted the program. This year, nine more colleges adopted the program. Eight of these nine colleges formed the Eight College Consortium and one, Fayetteville State University, joined the Five College Consortium.

It is significant that the program over the short period of four years has grown from 13 to 28 colleges and universities, from 100 to 456 participating faculty members, and from 1250 to 8900 enrolled students. The programs have attempted to achieve their objectives in public and state supported colleges as well as in private church affiliated colleges and other private colleges. The TCCP has been effective in colleges that have a rather select clientele as well as for those that have had a policy which closely approximates an open-door admission.

The educational development efforts of the TCCP have been aimed at (1) developing course content in English, mathematics, social science, physical science, biology, humanities, and philosophy that would be more germane to the student's experience than those materials traditionally in use; (2) defining current problems in the teaching of these courses, along with the ramifications of and possible solutions to those problems; (3) deriving a philosophy of education that would stimulate teachers to think of the need for altering their attitudes toward their role in the classroom and their students' academic problems and basic needs; and (4) developing methodologies and techniques that would stimulate and improve students' learning processes, and motivate students to assume an active role in their own learning.

The materials and techniques that have been developed are based upon three assumptions. The first, and probably most important assumption is that students can be more effectively motivated to learn and to become involved in the learning process when they are placed in a student-centered academic environment in which pedagogy and curriculum materials combine to ignite their intellectual curiosity; encourage a free exchange and expression of their own life styles, ideas, reflections, private insights and experiences; and build more positive self-images. The second assumption is that optimum learning conditions are more apt to occur if teachers assume roles as student guides and curriculum innovators, than when they assume the stance of classroom arbiters, and presumably, sources of all worthwhile knowledge. The final assumption is that teachers, when freed from the structures of syllabi and rigid course content, become more creative and responsive to students' needs and thereby make their teaching more pertinent to the students and more enjoyable for themselves.

With these aims and assumptions as guides, the teachers of the TCCP, along with the Institution for Services to Education staff, have exerted great efforts toward the development of the kind of curricular materials and teaching strategies that will hopefully promote the

desirable classroom atmosphere and academic results. The material core of the new curricula is as follows:

A. English (5 themes)

1. Choice and Temptation
2. Responsibility
3. Love
4. Power
5. Self and Alienation

B. Social Science (sequences)

1. The Basis of Community and Society
2. The Structure of Community Control
3. The Black Experience

C. Mathematics (units)

1. Experimental Mathematics
2. Tools and Concepts
3. Functions
4. Similarity and Trigonometry
5. Consumer Mathematics
6. Sets and Logic
7. Computer Science
8. The Real Number System
9. Probability and Statistics

D. Biology (units)

1. Nature of Science
2. Evolution
3. The Cell
4. Metabolism and Regulatory Mechanism
5. Reproduction, Growth and Development
6. Nature of Living Things
7. Genetics
8. Ecology

E. Physical Science (units)

1. Nature of Science
2. The Principle of Conservation Laws
3. Gas Laws and Kinetic Theory
4. Light
5. Chemistry

F. Humanities

1. Man--His Creative Awareness

G. Philosophy

1. Epistemology
2. Social and Political Thought

Within each of the themes or units, a number of techniques have been developed for engendering in students a positive self-concept which is coupled with a hearty thirst for knowledge, and critical thinking stemming from processes of association necessary for making connections between life in general, one's own experiences in particular, and the works one reads or creates; and a more positive attitude toward writing, stemming from a desire to communicate one's creative thoughts with respect to science, mathematics, and humanities.

The process used to devise curriculum and teaching materials has traditionally been limited. A small community of "recognized" professors-educators, either singly or in groups, carried the burden and received the accolades for developing the materials used by the broader post-secondary educational community. Therefore, it became inherent in this process that unacclaimed faculty in untouted universities are less apt to be credited with membership in the community of curriculum developers.

The TCCP, through the ISE, consciously rejected the traditional process and adapted a method of active

involvement of teachers. It is ISE's contention that only through such involvement would there be a strong possibility to sustain the curriculum innovation initiated. Therefore, in its role of working with the colleges through the teachers, ISE serves as a model of a particular teaching style, and as a generator of creative materials. However, ISE has adamantly refused to develop all of the methods and materials. Instead, ISE has taken a stance which reflects a fundamental belief in the fact that, with half an opportunity, teachers working with students could develop materials which would inherently have the best approach to creating effective educational returns for their students.

Granted, the traditional processes probably would have gotten the program further along the route to having completed sets of materials. However, while the procedure used was slower; it is now known that it was essentially correct and justified. Representative materials of the group's curriculum developmental efforts are now ready for national publication. This material has been viewed and reviewed by curriculum developers, by educational materials publishing houses, by teachers not using program methods, and by reputable persons working with educational theories and practices. All of them agree that this material represents a new, exciting and substantive deviation from the more traditional content matter.

More important is the fact that this interest has produced a marked effect upon the new authors. That is, the involved teachers have developed a strongly positive attitude towards their merit as teachers and educators, and towards their capabilities to perform a far-reaching service. No longer will they accept the notions that their contributions to higher education can only serve a temporary function and that their role must always be miniscule.

Therefore, the TCCP will not be their only effort to keep education alive and functioning on the local and national level. Moreover, the upward trend in the number of speaking and method demonstrations invitations received by TCCP teachers from traditionally emulated universities indicates that they create a national resource which can no longer remain undiscovered or untapped.

Development of the Biological Science Curriculum

In 1967, the Curriculum Resources Group of ISE held the first summer conference for the teachers in the new curriculum development program. Among the several courses offered was a Natural Science course which attempted to teach chemistry, physics and biology as a single subject. The basic objective of such a lumping was not clear, but seemed to be rooted in the fact that many

college freshmen are weak in science and would like to complete a year of it, usually required for the bachelor's degree, with as little emotional trauma as possible.

The early efforts to combine chemistry, physics and biology into a course acceptable to teachers in these areas, in addition to students, led to the division of the course into separate physical science and biological science components. Much of the effort in the ensuing three years was bent toward identifying the areas of interest to students, and building the teaching of biology around a rational series of topics of greatest interest to students.

The years 1967 to 1969 were spent exploring the interests of students. In the summer of 1969 the experiences of those two years were reviewed and reduced to eight units of study (based on the main areas of study in biology). Four of these were tested by all teachers in the program for their teachability and learnability in the classroom, with the remaining four units being used in a less coordinated way. At the summer conference in 1970 the major efforts were to introduce the new teachers from the new Five College Consortium to the materials and methods of the course as then developed, and to revise the eight units in the light of the experiences of teachers during the previous school year. At that time teachers indicated in more detail the scope of the

headings in the unit outline, extending some topics and eliminating others, and added some other approaches to the presentation of concepts.

During the school year 1970-71 the ISE biology staff, in the course of carrying out the editorial function, undertook the task of rendering the outlines more readable and nonrepetitive, and seeing that the information was considered at a level equal to freshman year capabilities. In addition, some essays were written on the objectives and spirit of the curriculum reform effort, teacher self-concepts, motivation, and leading discussions. These were all published together by the Institute for Services to Education as the Teacher's Guide to Classroom Discussions for Biology.

During the spring of 1970 a laboratory manual, requested by teachers at the 1969 summer conference, was assembled from the exercises suggested for the eight units of study, and rewritten. This manual was introduced at the 1970 summer conference. During the fall of the 1970-71 school year 15 of the 20 teachers elected to use this manual in their courses. During the spring, all students in the TCCP and Five College Consortium used it in field tests.

During the fall of 1970 a Teacher's Guide to Laboratory Activities for Biology was written by the ISE

staff to serve as a supporting platform for teachers using the laboratory workbook.

This workbook or manual, Laboratory Activities for Biology, was revised in late spring 1971 to include teachers' suggestions for increasing its usefulness. This revised edition was being used during the 1971-72 school year. The three books in this series comprise a single integrated course, with Laboratory Activities for Biology serving as a student workbook.

Although the 1970 summer conference has been very successful in fulfilling the objectives for which it was designed, it became apparent as the fall term passed that there were teacher needs which had not been fully met. Among these, the following were salient:

1. There was a definite need to extend explanations about the unit material, and to provide opportunities to actually do many things, because some of the activities described or recommended had a "twist" to them that was somewhat unfamiliar to the teachers.

2. There was a need for teachers to be involved in the early steps of organizing and writing a unit of study in order for them to understand the process and to develop a personal relationship with all of the materials.

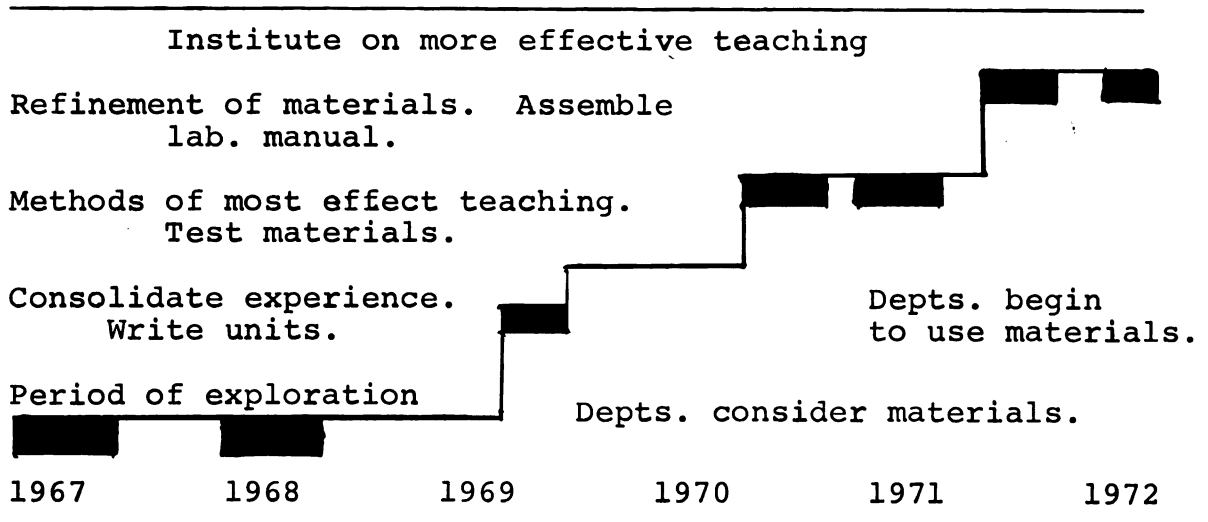
3. There was a need for teachers to know more of the background of forces and counter-forces acting in curriculum change--that is, curriculum change is not limited to the teacher and student only.

To help overcome some of these difficulties, which lay beneath other problems teachers were having during the fall term, a group of five teachers was brought to Washington, D.C. during the week of January 4, 1971, for a reorientation. The approach was symptomatic or "clinical." That is, it dealt with the intellectual problems of teaching style, and practical problems of discussion, of perception and of writing. Quite importantly, teachers were given the opportunity to work through some of the exercises in the laboratory manual. The teachers felt that the experience helped them to approach their teaching with greater confidence, and the ISE staff concluded that the individualized help available in a small group of five or less could serve as a prototype for action during the summer conference for 1971.

Summer Conference

Pre-Conference Planning

Below a diagram is presented which represents in graphic form the schedule of major activities by year and levels of complexity (degree of complexity ignored) as seen at the end of the summer conference in 1969.



The 1970 summer conference report for biological sciences ended with the projection: "For the summer conference in 1971 we propose an institute-type activity with emphasis on teaching techniques and procedures, classroom organization, and the best use of materials developed so far in the Thirteen College Curriculum Program." By March, 1971, therefore, the needs seemed quite clear so that plans for the summer were started with at least five general objectives in view. These were:

1. The orientation of new teachers into such areas as the philosophy, materials, teaching style, laboratory activities, supply for discussions and laboratory.

2. Helping teachers to become more sensitive to the reactions of a class and to translate their impressions of classroom activity into writing.

3. Giving some teachers the experience of starting the organization, investigation, coordination and writing of some curriculum materials by working on new units which would be sequels to the units of study already developed in biology.

4. Providing teachers with more background information about the forces acting in curriculum change; and

5. Using the conference (ISE staff) as an experimental vehicle for studying more effective methods of carrying out an institute-type conference, with attention focused on group size, use of program associates as teachers and advisors, and the structuring of staff and participant time.

It was recognized that it would be a terrific challenge to accomplish these objectives in a six-week summer conference; yet that seemed to be the task. The numbers of teachers participating would be greater than ever before, viz:

<u>Year</u>	<u>No. of Teachers</u>	<u>Full and Part-time Staff</u>
1967	10	1
1968	10	7
1969	12	8
1970	21	5
1971	32	5

The location (Dallas, Texas) would be distant from our base of operations (Washington, D.C.) and the staff would

have to be expanded for the summer without much real chance to give that staff the kind of indepth orientation that it really needed, even though they had been teachers in the program for several years. Nevertheless, it was the hope to complete the summer with a group of teachers who were prepared to teach the ISE biology course in the desired style, with a minimum of emotional insecurity about caring for (liking) students, and being willing to be open and frank about their discussions of the course content. We also wanted the teachers to have the opportunity to work cooperatively together with a program associate in the development of a feeling of relatedness to the teaching materials.

Our first evaluation was that we would not be able to do all of this for all teachers, so we developed two programs. Program A would concentrate on the first objective and Program B, primarily for teachers who had some experience teaching in the program during the year, would concentrate on assembling and writing a unit of study. In each case we would deal with small groups of five or less most of the time, larger groups, sometimes, and arrange the schedule so that Program A would meet for half a day and work unassembled for half a day. Program B would work the other half day and work unassembled while staff was engaged with Program A. Although this meant a double conference after the first week, it would

allow any teacher who so desired to participate in all of the activities offered during the conference.

The linear organization of the conference, then, was to begin with a week of orientation as to what the program was about and the methods used to achieve those objectives, including the teaching style. This was to be augmented by demonstrations of teaching style, content organization, "student involvement," etc., both within the biology program and through four demonstration sections arranged for the whole conference and put on by the staff in English, Mathematics, Social Science and Physical Science.

The second part of the conference (weeks 2 to 6) consisted then of two separate activities, with a group of 19 teachers involved in a clinical treatment of the teaching and report-writing problems of each teacher in Program A. The other fourteen teachers were designated for Program B, where they attended a class on the basic units of study (Unit 1--"Nature of Science," and Unit 3--"The Cell") for two weeks, followed by the writing of preliminary versions of some new units of study.

Several experiments were built into this organizational structure, the hypotheses for which might be most easily stated as questions to be answered. They were:

1. How can such a large group of teachers be given the kind of individualized help that the 1969 and 1970 summer conferences had demonstrated to be essential to even partial understanding of the program and for adequate productivity?

2. While most new teachers would be placed in the Teaching Clinic (Program A), would this be as effective for their orientation to the program as putting them into Program B?

3. Can such a conference, requiring many items of material, equipment, library resources, etc., be successfully operated far from the normal ISE base of operation in Washington, D.C.?

4. Can teachers be oriented as effectively, or even adequately, in classes of 12 to 16, as in groups of 5 or less?

5. Is report-writing by teachers a matter of "finding the time" or is it a matter of not having skill in this area?

6. Can improvements in the writing of reports be handled in classes on reporting as well as in the smaller groups?

7. Does "intellectual" orientation to the course and to the program need to be augmented by "practical experience?"

8. Does participation in the writing of teaching materials (units of study) develop a deeper sense of commitment in the teachers involved than learning the teaching style? (Compare with 2 above.)

Site of the Summer
Conference

It was verified in late February by ISE that for the first time the summer conference of 1971 would be held outside of the Boston area. Bishop College, Dallas, Texas, was selected as the site for the 1971 summer conference. This was also the first time for the summer conference to be held on a predominantly black college campus.

The schedule, as finally evolved, appears in the appendix. No changes were made in the program itself, but there were changes in the room assignments for the various groups from time to time.

In April we began to make a list of the laboratory experiments that would probably be done at the conference. However, there was considerable uncertainty about the number of people who would be attending, so the supply orders could not be sent out until it became apparent that perhaps 50 per cent attendance would be achieved. This was about mid-June. Thus many supplies did not arrive before departure for Dallas. Some supplies were ordered for delivery in Dallas. However, the time-lag

for acquisition is more than four weeks. Supply houses in the Dallas area could not supply us on short notice; in addition, there was a problem concerning the credibility of our purchase orders, so that supplies had to be ordered and sent from the Washington area. This all meant that many items needed for the second and third week did not arrive until the end of the conference.

Since the teaching of the units was to be the primary program (Program A) for the summer, we set out in April to obtain as many complimentary copies of books on the reference list as possible. Publishers, however, were reluctant to send copies except where it could be shown that the book was being used as a text in a course. The response to the appeals was small; thus books had to be ordered through regular purchasing procedures. An inventory of about 200 books was taken to Dallas; these served as a vital supplement to the rather restricted number of books in areas of biology of interest to the conference in Zale Library.

Organization of Teachers

During the orientation period all teachers met together all day. On Thursday of the first week, 19 teachers were designated for work in Group A and the remaining 14 were assigned to Program B. The group for Program A assorted themselves into four groups of four

and one group of three; these were designated Groups A, B, C, D, and E. Each group was then assigned a program associate to guide and advise it. The first teacher on the list was designated the group teacher for the first week; the second person listed was designated group recorder. The other two teachers were to be students, paying attention to the way that the teaching "came through." In the third week, Teacher #2, who had been recording, became the teacher-of-the-week and Teacher #3 on the list became recorder, and so on until the end of the conference. Five units of study were designated for familiarization during the conference in this program, Units 1, 3, 4, 5, and 8 ("The Nature of Science," "The Cell," "Reproduction," "Genetics," and "Ecology," respectively).

The teacher-of-the-week was responsible for organizing the discussions of the unit materials (using the Teacher's Guide to Classroom Discussions for Biology), including the use of teaching aids, assembly of laboratory material, and conduct of laboratory work on four days of the week. There was a half-hour teaching conference period to discuss with teachers the location of materials and teaching problems. Much of the evaluation of the teaching and the advisement of teachers about their approaches and styles was done by the program associate assigned to each of the small groups.

Each teacher in each group was to serve as group recorder for one week. His task was to observe the group dynamics and try to identify any condition which was followed by evidences of interest, such as spirited discussion or activities expanding upon those presented in an exercise.

For Program B, the topics on which new units were to be written were listed and teachers signed up for the ones most interesting to them, although membership was originally limited to four. The topics and relationship to other units were as follows:

<u>New Unit No.</u>	<u>Sequel to Unit No.</u>	<u>Title</u>	<u>Program Associates</u>
9	8	Water and Water Pollution	Dr. Obasun and Mr. Banks
10	6	Animal Behavior	Dr. Harris
11	3.6	Some Actions of Common Drugs	Dr. Goolsby
12	4	Human Reproduction and Its Control	Mr. Anthony and Mr. Banks

Orientation of Teachers and
Implementations of the
Program

For the orientation of teachers at the 1970 summer conference, a series of lecture-type presentations were given by officers of the ISE and TCCP staffs, with no extended demonstration of the methods, approach or style of teaching desired. For the 1971 conference we

decided to only use inductive discussions of the topics. These dealt with such questions as "What is the TCCP, FCC and CC?," "Curriculum Change--Who's Concerned?," "Teacher Image Related to the Desired Teaching Style," and "Leading and Participating in a Discussion." Xerox copies of the orientation chapters for the Teacher's Guide to Classroom Discussions for Biology had been handed out and reading assignments made. The discussions were adequate. There seemed to be some uneasiness among the new teachers because they expected to be lectured about these topics. Experienced teachers from the Five and Eight College consortia participated freely and with ideas positively oriented toward the desired points. Gradually, new teachers began to join in the discussions. One teacher, however, felt that there were too many opinions being expressed and not enough facts. That particular teacher did not seem to change from that viewpoint during the six weeks of the conference. Many teachers (from two larger schools, especially) had been told that their job at the summer conference was to write syllabi for new courses and that the ISE staff was at the conference for the purpose of helping them do this. Teachers from another school had received some information taken from an experimental brochure of the TCCP, October, 1968, and wondered why we did not seem to be plugging for the use of the textbook Biology by Helna Curtis. Almost all of the teachers from

the TCCP felt that the purpose of the conference was merely to discuss ideas, starting from scratch, instead of building on the experience of other teachers over the last four years. The discussion sessions were very good for bringing out this startling information. We could respond in part about what the summer had in store, but the best counsel was for teachers to wait another week until they would have a chance to see some of the curriculum materials already developed before writing themselves. A group of six or more teachers who came with instructions to write a new course were very much surprised to find that a laboratory manual and guide and teaching units had already been developed.

By the time the conference demonstrations of the teaching methods were ready, so were the teachers ready to view them. A check sheet (see appendix) was handed out to teachers to help them analyze what they saw and to record their responses. The choices under each heading are polarized between the traditional, lecture method and the progressive, inductive method in the areas of teaching style, content organization, student involvement, etc. These notations became the basis for some post-demonstration discussions.

The value of this approach was that it brought out the different ideas that teachers brought to the conference about what they were supposed to do, and it helped

us explain more specifically the things that would be expected in the program.

Program A--The Teaching Clinic

Teachers seemed to have gained an intellectual understanding of what the program was about during the orientation week. In the second week the small groups began to function and teachers began to have an opportunity to see if they were as good at discussion and laboratory teaching as they had supposed they were. These small groups continued into the sixth week. The biggest difficulty in successful discussion-leading was teacher weaknesses in the various subject-matter areas covered. (A teacher who is knowledgeable in anatomy may not be very knowledgeable in ecology or reproduction.) Since teachers did not have a choice of which units they would teach, a teacher often found himself leading discussions in an area where he was not well prepared. Most teachers, however, seemed to accept the assigned unit and tried leading the discussion even though they themselves might have been quite weak on the topic. Teaching the unit was not only useful in getting the teacher-of-the-week to read the unit carefully, but also to get him to think about inductive approaches, needs for the laboratory work, etc., associated with the unit topic. The "students" at first were a little stand-offish, but after a

week or so became constructive critics of the teacher-of-the-week, along with the assigned program associate. A few teachers said, "We came to look on our program associate as our graduate advisor," and that relationship contributed to good morale and good productivity in the teaching groups.

While the units offer a logical sequence and the laboratory manual has the kind of experiments that teachers picked out, there was latitude for injecting skills and information familiar to the teacher. For example, in the exercise on the titration of buffers (boric acid, triphosphate, etc.) one teacher wanted to know if milk were a good buffer. They tried titrating it and discovered pH (acidity) at which it curdled. They also found it to buffer slightly (as is well-known to biochemists). Later, when studying meiosis, rather than use the prepared slides of *Ascaris* eggs, another teacher went outside, caught some grasshoppers, and demonstrated how a squashed preparation of grasshopper testes could be made and the chromosomes strained and studied.

There was some interaction with Program B--Unit Writing. The lecture-demonstration arranged by the teachers writing the "Human Reproduction and Its Control" unit invited a representative from the Planned Parenthood Association to demonstrate birth control apparatus for all teachers; this fitted in well with the activities of the

groups when they studied Unit 4--"Reproduction," etc. Also, in this same vein, the group writing on "Water" invited Dr. Fred Humphries to give a lecture on the structure of water for all the teachers; this tied in well with Exercise 9--"The Water Content of Some Cells and Tissues," done in Program A, as well.

For the Ecology unit (Unit 8) some groups took field trips on the Bishop campus but these had to be abandoned because of the chigger infestation. Water samples were taken from the Trinity River and from White Rock Lake for analysis (also done by the unit-writing group dealing with "Water"); they also studied plant succession at the lake. Several groups toured Animal World, a game preserve for tropical beasts--rhinos, lions, etc., which roam in the open while spectators remained closed in air-conditioned cars. (Related to Unit 7--"Variety of Living Things.") This experience gave them some different, first-hand feelings about these animals.

So, in addition to being a familiarization exercise, the teaching clinic was also a device for increasing teacher knowledge and confidence.

Program B--Unit-Writing Groups

Program B was composed of teachers in the Five College Consortium and some teachers from the TCCP schools. The teachers in the 5CC had experience teaching in the

program during this year, while new TCCP teachers were quite unfamiliar with the units.

During the second and third weeks the teachers in this program were taught Unit 1 and Unit 3 by the ISE staff, with Dr. Obasun handling the discussions on Unit 1--"The Nature of Science," and Dr. Goolsby taking Unit 3--"The Cell." Although discussions were used instead of lectures, it was our impression that these teachers did not do much reading in the subject matter of these units. They did, however, participate well in the laboratory activities and in general it was a learning experience for them.

On Fridays of each week conferences were held to discuss the progress of each writing group in making an outline for the new unit each was writing. These conferences were held for participants in both Programs A and B so that all might share somewhat in feeling related to the material.

The mornings of the fourth and fifth weeks were devoted to reading, discussions, and trying to write annotated outlines and approaches. This kind of writing was not easy for the groups to master. There was a great difficulty in summarizing reading assignments, difficulty in finding appropriate reading materials, and difficulty in achieving a feeling of commitment to pursue the intellectual tasks involved in researching the topics. In the

end the groups assembled information on the topics but few if any approaches to conveying concepts seemed to be achieved.

It was the intent of the staff that the writing project extend through the school year, with teachers trying out the preliminary units and making suggestions for their improvement. It seems somewhat in contrast that teachers who have had successful years of teaching would not find it almost "second nature" to be able to think in terms of approaches. Some teachers have made comments on materials and techniques in their annual reports relating to the very things they were trying to put together in the units. It has been concluded, not only by the biology staff, but by other discipline staffs in the ISE that involvement in writing materials is one of the most effective ways to get teachers to commit themselves to the program materials. The indications are, however, that we must give some study and thought to more effective ways of organizing group writing experiences.

The Conference as an Experimental Vehicle

Question 1:

How can such a large group of teachers be given the kind of individualized help that the 1969 and 1970 summer conferences had demonstrated to be essential to even partial understanding of the program, and for adequate productivity?

The preconference estimate of the number of teachers that would attend was 33, as contrasted with 20 in 1970. The success of the writing conference in the summer of 1969 had rested upon small group theory. In the summer of 1970 there were discussions in groups of about six members and also with the group of 20, mostly carried on without the participation of a program associate during either the review phase (which also supposedly introduced new teachers to the materials) or during the unit revisions.

In January 1970, a group of five teachers was asked to come to Washington for a week of work on teaching. At this time orientation was individualized, and the problems dealt with symptomatically. These experiences pointed to the greater effectiveness of small groups advised by a program associate.

In order to deal with 45 teachers at one time would have required a staff of 10 program associates. We were allotted four, but this was raised to five, enough to handle 19 teachers, for a half-day of assembled activity. The other half-day was to be spent in preparation for the next day's activities. This group was designated in the schedule as Group A because its work was the primary work of the summer conference.

This arrangement was very effective for giving each teacher a chance to contribute or try to understand

the material in the unit outlines, and to work with any problems in the related laboratory exercises. Perhaps one of the most significant events in this regard was the admission by a few teachers that they did not know enough biology to teach this course. Most teachers revealed in their teaching that they needed to know more but would not voluntarily admit this.

Question 2:

Can such a conference, requiring many items of material, equipment, library resources, etc., be operated successfully far from the normal ISE base of operation in Washington, D.C.?

In preparation for the conference many chemicals, items of glassware, and preserved biological materials were ordered from our usual East Coast suppliers. Because the attendance list was late in being confirmed, orders could not be placed with confidence until mid-June. When materials arrived, a good many items were marked as back-ordered. The attempts to get supplies in Dallas were unsuccessful because credit had not been established, and also because these firms could not supply large quantities of items on short notice. (They had to be ordered from manufacturers by the suppliers.) Even grocery store items were generally not available because of the distance to the grocery stores and the lack of transportation.

About 200 volumes of books were carried to Dallas with us. There was practically no library support for our activities in Zale Library. The inter-library loan service with neighboring institutions can only be described as "virtually nonexistent."

In addition to supply problems there were space problems for teaching activities.

Despite these difficulties, and because of the energy and enthusiasm of the teachers and the undaunted spirits of the ISE program associates, we were able to do about 75-80 per cent of the projected program activities.

Overall, the ISE staff was unable to offer model experiences during the summer because of being far from normal base of operations, supply, and library resources. However, the laboratory experiments offered did present challenges to teachers (both with regard to technique and information), so it was considered a learning experience well worth the effort.

Question 3:

Which was more effective for the introduction of teachers new to the program, Program A or Program B?

By the end of the third week it began to be apparent that the class approach to teaching styles (as demonstrated by the staff for Program B) was less effective in bringing about a change in teacher attitude toward the material and the teaching style than was the small

group method. The teachers in Program B attended the conference because most of them (not all of them) had taught in the program during the past year. The presumption was that they needed the teaching clinic less. This was not entirely true as was revealed. The SCC teachers will return for another summer to participate in the teaching clinic activities. While the unit-writing experience seems essential to developing teacher-relatedness to the materials, it appears to be less effective than the teaching clinic in caring for the individual problems of teachers and for dealing with the conduct of the course.

Question 4:

Can teachers be oriented as effectively, or even adequately, in classes of 12 to 16, as in the group of five or less?

No (see preceding question).

Question 5:

Is report-writing by teachers a matter of "finding the time" or is it a matter of not having skill in this area?

During the past year only about 25 per cent of the teachers responded to our requests for descriptions of class activity or "enlightenment" in the classroom. Teachers in Program A spent a week as group recorder during the conference and each was charged with watching the group and recording events which resulted in bursts of interest (as indicated by lively discussion, extended

laboratory work, etc.)). During the second and third weeks the recorders consulted their group program associate, but the hour set aside on Fridays of each week for evaluation rarely dealt with the problem of reporting in the desired framework.

In the fourth, fifth, and sixth weeks, the reports were discussed in detail by the program associates in the small group, and a more personal approach to the reporting problems was made. Some teachers wrote fairly well, while a few had serious problems with understanding what they were to do and how they should write. It took two or three conferences and the same number of rewrites to even begin to get present the spirit of the encounters in the report. Experience with reports that summer would indicate that perhaps nine of ten teachers can write reports in the desired form and style with explanation and help. "Time," therefore, seems to have been the inhibiting factor. The group of teachers reoriented in January, 1970, wrote good year-end reports. We therefore look forward to reports from this group of teachers that will reflect a sensitivity for the reactions of students to the teaching done.

Question 6:

Can improvements in writing reports be handled in classes on reporting as well as in the smaller group?

Perhaps with a different approach, report-writing in classes will be effective.

Question 7:

Does "intellectual" orientation to the course and to the program need to be augmented by "practical experience?"

There seemed to be little doubt that the understanding of what it was that should be done in class was intellectually understood. Teachers improved in teaching style as they went through their teacher-of-the-week experiences. They could not perfect the style in one week, but they became conscious of the ways in which they individually needed to improve during the school year.

Question 8:

Does participation in the writing of teaching materials (units of study) develop a deeper sense of commitment to the teachers involved than learning the teaching style?

The teaching clinic developed a greater commitment to the teaching style; the writing experience, a greater commitment to the materials. Writing units, however, did not develop teaching style, this depends upon the teacher having a firm grasp of the teaching style concepts.

Administration

During the summer there was communication with a number of visitors interested in what the group was doing.

Among the more formal contacts were the conferences with teachers and directors about the coming year's budgets. Another was when Dr. H. K. Wood, Chairman of the Department of Biology at Tennessee State University visited with two of his staff, his five teachers participating in the conference, and Dr. Colquitt (Senior Program Associate for Physical Science) to talk about a combined biology and physical science course at their school. The biology outline of units presented was essentially the same as the outlines prepared by the program teachers, so that there did not appear to be any conflicts. The teachers were using the biology laboratory manual for laboratory work and some units from among those available.

The group of eight teachers from Southern University in Baton Rouge were under the impression that they were to write a new course that summer with the help of the ISE staff. In the light of the fact that the materials of the course had been revised, the coordinator agreed that the teachers would use the laboratory manual in 1971-1972, instead of writing a new one and would work from the available units of study before diverging to the writing of new curricular materials.

Dr. Stanton Hoegermann from the Department of Biology at Lincoln University was a participant of the conference in the teaching clinic. He felt that he would like to use the ISE course for the 150 students in his

"regular" biology classes this year, thus constituting an implementation in biology at Lincoln University.

All teachers, except the groups from Tennessee State University and from Southern University, Baton Rouge (these had to get the approval of their staffs at home) filed proposed schedules for teaching the units and accompanying exercises from the laboratory manual. These schedules not only show the various ways in which teachers may sequence the units and activities, but serve as their declaration that they will be teaching the ISE course this school year.

The kind of teaching and advisement dispensed in the small group required the full attention of the assigned program associate. In the future, the senior program associate, who handled administration, and the program associate who handled supply and laboratory preparations, shall devote their time to these activities and the administrative meetings (Orientation, Teaching Conference, Evaluation, and Administrative Conference in the schedule). In addition, for succeeding conferences, one program associate should be provided for each ten teachers. This would mean that to handle a group of 50 teachers next year there should be seven program associates, a laboratory helper and two typists (one of which serves as librarian).

Projections for the Future

This fall an editing and corrections project lies before the ISE biology staff with regard to the four new units started this summer before these can be sent to participating teachers for classroom trials this year, 1971-1972.

There is need for computer storage of information about the materials and equipment needed for demonstration and laboratory exercises in the various units of study, and directors need to know the cost of the course. Since teachers select exercises from a range of exercises, select units from among those available, etc., the cost of each item, a supplier, and the quantity required is needed for determining costs. During the year it is hoped to develop this information and a program for its retrieval so that the cost of the course selected by teachers may be quickly estimated.

The experiences this summer have helped to make a projection for the summer conference in 1972. When we look at the problems, the results, and at what is believed to be most-needed items, it may be concluded that the teacher is the key person in the improvement of the education of students, and their efforts to improve the quality of the information that is taught, and the style in which it is taught, depend upon the level of anxiety that teachers feel about their information.

During the summer of 1971, as during the summer of 1968, graduate credit was made available to teachers who wished to pay the tuition and fees assessed by Brandeis University (1968) or by North Carolina A & T State University (1971). During the summer of 1971 a total of six credit hours could be accrued in two three-hour courses.

ISE proposed that money be provided in the budgets of all participating colleges for the tuition and fees for three credit hours of graduate work in biology to be pursued as a graduate course (in addition to other activities) during the 1972 summer conference. The course, entitled "Graduate General Biology," or some other suitable and acceptable title, would be a detailed, critical study of the several areas of biology and the scientific method. The course would be designed and taught by members of the ISE staff, or acquired for the ISE staff, as adjunct faculty members of the North Carolina A & T University Graduate School, with examinations and grades determined in accordance with the regulations of that university. During the five weeks following orientation a half day each week could be devoted to this course, during which time the equivalent number of hours of discussions, lectures and reports, and of laboratory work could be accomplished. The other half day would be devoted to teaching

and writing projects which could be used for graduate credit at the participating teacher's own expense.

Summary

The project of biological science curriculum development that began in 1967, was resolved into eight units of study during the summer of 1969, has been revised and rewritten during the past school year. Also, the laboratory manual, Laboratory Activities for Biology, has been compiled and tested by some 1500 students during 1970-71 school year in addition to a teacher's guide. During the coming school year, 1971-1972, more than 100 teachers and over 6500 students will be using ISE biology materials in their courses. While these materials have probably reached a developmental plateau for the time being, four new units of study have been started.

The program of the 1971 summer conference attempted to deal with several questions--orientation of almost 40 teachers who had not taught in the program prior to the 1971-1972 school year in the philosophy and aims of the program, to familiarize them with the content, style, laboratory activities, and supplies of the course. For other teachers who had had previous teaching experience in the program, there was an emphasis on the development of new materials for teaching.

Throughout the conference activities we tried to find a better way of doing things. It was the ISE biology staff's opinion that during this summer more teachers had been oriented more successfully, and in less time, than ever before. Although we can look on the activities of this summer with considerable satisfaction, there is still room for improvement. Nevertheless, this summer conference will produce more effective teaching in the participating schools this coming school year, 1971-1972.

Development of Physical Science Curriculum

The physical science post curriculum development was much like that of the biological science curriculum post development. During 1967 to 1969, time was spent exploring the interests of teachers and students, but very little progress was made in terms of compiling any effective or useful physical science units. The physical science curriculum development has not quite kept pace with the biological science curriculum development. Some progress has been attained; but much more is desired.

Pre-Conference Planning

At the end of the 1970 summer conference, there was a general consensus of the teachers and the CRG staff concerning the logical steps in the development of the physical science program. Consensus was strongly in

favor of a good foundation for a physical science course in accord with the philosophy and techniques of the program but the ISE units had not been developed or completed at that time. Secondly, students' problems had not adequately been met, especially those students who were not able to follow even the simplest algebra in the ext. Some students would not do this kind of work out of lack of interest or motivation while for others the problem was a lack of basic mathematical skills. Thirdly, the ISE evaluation materials were discussed at the 1969 summer conference but nothing definite had been developed along this line. Finally, a set of teaching techniques and a laboratory approach built around the "student-centered" approach and a "laboratory-oriented" physical science course was used, but no set of descriptive materials had been developed that would convey to a teacher outside the program a feeling for what the program was trying to accomplish, nor its successes and difficulties in doing so, nor the rationale behind the techniques being used.

It was decided at the end of the 1969 summer conference that in addition to the two general meetings held in Atlanta which were designed to discuss the progress of the course and the difficulties that had arisen, there should be two additional regional meetings. These conferences were designed to discuss uncompleted topics.

A conference on evaluation was then agreed upon. In addition, the teachers expressed an interest in exploring the possible uses of the computer in meeting some of the needs of the course. It was proposed that the computer might help in dealing with those students who had mathematical problems, perform some tutoring activities, and could stimulate some physical or chemical situations. Consequently, it was agreed that the second regional conferences should be used to explore the possibilities of using the computer in the course.

At the Regional Conference on Computers, held in Huntsville, Alabama, in April, 1971, there were demonstrations of programmable calculators, analog computers, and digital computers. The participants visited the Redstone Arsenal in Huntsville and observed how computers were used in the laboratory. Discussions were held during the two days with Dr. J. Castle of the University of Pittsburgh Learning Laboratory on the use of the computer in various educational projects ranging from computer assisted instruction (without a teacher) through various combinations of teacher-student-computer interactions. It became clear that the computer did offer many possibilities for application in this course. Therefore, it was decided to have a computer terminal (G.E. Timeshared Teletype Terminal) available at the summer conference and that attempts would be made to develop units using it.

The regional conference on evaluation was held in Norfolk, Va. The main item of discussion was the standardized-style test developed by the physical science group in March, 1971. A careful discussion of the test, its structure, and what information could reasonably be expected from it, indicated that although it was useful for some purposes, it certainly did not provide teachers with all the information they really needed. It was agreed upon that new forms for the test should be explored: a test that would attempt to probe at student attitudes, and that ways should be explored as how to better test the student's ability to deal with abstract analytical and synthetic questions. Also discussed and agreed upon was the importance of tests in the classroom. The kind of test a teacher gives will determine to a great degree the material that the students will try to master and the way they will try to deal with it. Consequently, it is important that the tests given in the classroom reflect the philosophy of the program. It was decided that it would be useful for the group to develop model chapter tests that would exhibit the kinds of questions that would best test the skills the program wished to examine.

It was thus established that the 1971 summer conference would be devoted to developing units of laboratory exercises to supplement the text for both advanced and

poorer students to use; in addition, work on the computer would be devised. It was also decided that the group should devote some time to the development of more advanced instruments of evaluation to supplement and replace the one developed by the physical science group in the spring of 1970. Finally, it was decided that some time should be devoted to the question of what sort of materials should be produced to convey to others information about the program and to facilitate implementation of the course on campuses now involved and those to be involved at a later date.

The Summer Conference

It was discovered at the beginning of the summer conference that there would be available to the group a number of freshman students who would be entering Bishop College in the summer. Ways were immediately incorporated to make good use of the presence of these students for the summer program (while at the same time providing them with high quality education). The group decided that having these students in classes would allow the new teachers in the program to gain some feeling for what the original TCCP teachers had been doing and to give the new teachers an opportunity to try out these techniques for themselves. In addition to the classroom activities, there was the opportunity to work with these students in the laboratory--

observing their reactions to the laboratory experiments, trying out new experiments, and modifying old ones. Also experimented with were some of the early computer materials.

The conference was staffed in physical science by Lee Colquitt, of the CRG staff, a full-time summer consultant from the University of Kansas, and Ralph Turner, a part-time summer consultant from Florida A & M University. Typing and some laboratory help were provided by Mrs. Barbara Edwards of the CRG staff and Mrs. Donna Russ. The major responsibilities for the summer's work were assumed by Colquitt and Turner. The teachers were divided into roughly two groups with one staff member working with each group. The group with Mr. Colquitt worked primarily on developing units for use with the computer together with some on evaluation, while the group working with Mr. Turner discussed problems of teaching techniques and the laboratory portion of the course.

The initial structure of the summer's work allowed about 15 hours/week for group meetings, discussions, and individual work on group projects. About five hours/week were allotted to participation in the class or observation of it, and about five hours/week were allotted to discussion of the class after it occurred. Finally, about four hours/week were allotted to the reporting of the progress

made by one group to the other groups. The teachers felt at the beginning of the summer that those time allotments would allow them to work effectively--with the proviso that they could be changed during the summer if experience warranted it.

The computer group began the summer with an evaluation of the possibilities offered by the computer for attacking some of the persistent problems in mathematics and physical science encountered by the students. Among the students' difficulties were a lack of experience and training in thinking a problem through to its solution, poor mathematical skills, an unwillingness on the part of many to go through computations involved in reducing laboratory data to a form required for interpretation, and a poor grasp of the functional relationships between physical quantities.

Over the course of the summer, the computer group decided that the computer could deal effectively with all of these problems if it were used in a variety of ways. The main emphasis would be on getting the student to do his own programming. This would force him to think through a problem to the degree required to program the computer (thereby exercising logical skills in a context in which they were not an end in themselves). By freeing the student from some of the drudgery involved in working with the laboratory data, he could concentrate on physical

interpretation of the measurements and the meaning of the data. It was also decided that the computer should be preprogrammed at times to handle the laboratory data so that the students could get the results of their experiments immediately. Finally, the computer could be programmed to simulate some physical relationships (e.g., the gas laws); a student would input data and observe the output. He could then develop some abstract ideas (to complement the concreteness of the laboratory) of the functional relations between physical quantities.

The teaching techniques group was interested in the following questions:

(a) What is it that the group is trying to do in teaching physical science and how could an ideal class be described?

(b) How may the degree of success be best measured?

(c) Once these desirable characteristics and techniques employed on the program had been identified, how may they best be formalized so that they may be communicated to others?

This group began by trying to develop a framework within which the analysis of teaching techniques and teaching situations could be carried out. They initially focused on the details and mechanics of the methods of teachers in the group. They hoped to develop an analysis of what

a perfect teaching situation would be, including teacher-student relations, and an optimal ratio between discussion and lecture, between laboratory and classroom, between drawing students into the work and requiring that they do it, etc. It was also intended that the framework developed by the group would serve as a basis for conducting an analysis of the classroom activities during the summer conference using Bishop College freshman students. The framework, and the information obtained by using it in analyzing the course, would then become part of the materials of the physical science course and would serve to orient new teachers as well as to provide those people already involved in the course some measure of what they had done or were doing. It was thought that it might even suggest new directions for techniques or materials.

The laboratory group had available to them two laboratories--one primarily a physics laboratory and the other primarily a chemistry laboratory. Since the teachers involved had taught the course and were very familiar with the experiments, this group began with some of the modifications that had been tried during the school year. Their purpose in developing new activities and in modifying the old was to get some of the bugs out of the old ideas and find new ways to better communicate what was desirable for the students to adsorb. The most important factor, however, was that the majority of the

experiments developed over the years in this program and in other curriculum projects lacked the "open-ended" quality that the group thought necessary. The "cookbook" style experiments common to colleges for many years were definitely not suitable for actually involving the student in a physical or chemical investigation--to the point where he is able to abstract for himself certain aspects of the system that are physically or chemically relevant. It has been demonstrated by past experience that such "open-ended experiments" required much more careful planning and development than the "cook-book" style.

No evaluation group was formed at the beginning of the summer. It was planned that the functions of evaluation would be coordinated by Lee Colquitt and that the whole group would participate in the development of a test-item pool to develop new kinds of questions that would effectively test for the skills the group was trying to develop. Most existing tests were oriented too heavily toward remembered information and not enough toward analytic and synthetic conceptual abilities. It was planned that James Mayo, head of the physics department at Morehouse College, would work with the group one week during the summer on the problems of developing an overall evaluation of the program.

In the course of the summer's work, some problems in the initial conception of the summer began to emerge.

The after-class, self-analysis sessions, of the teachers were not as successful as had been hoped. The classes were well-attended at the beginning of the summer by teacher-observers, but since they sometimes outnumbered the students, the teacher responsible for the class often felt inhibited. Furthermore, the class did not resemble an ordinary class at one of the colleges in that it was six weeks rather than 14 or 15 weeks long and the teachers responsible for the class were changed approximately once a week. The most helpful aspect of the class was the opportunity it gave new teachers to try out methods of the program in a supportive context.

Another of the difficulties in the teaching techniques group, as in the computer group and the evaluation group, was that at the beginning of the summer it was not clear precisely what was being sought. As the summer progressed, this did become clear; but finding the sought-for materials in a given class was a matter of chance. Furthermore, it seems to have been the case that most of the teachers were not sufficiently secure professionally or with each other to engage effectively in much deep public criticism of each other. This problem is expected to decrease to some extent, as it has every summer, as time goes on. For these reasons, attendance at the classes dropped off during the course of the summer, and the results derived from the class and discussion were

moderate--worth the effort but not as much as had been hoped.

The computer group got off to a reasonably fast start in learning the computer language BASIC. The main problem this group encountered was the development of a rationale and direction for the units; a rationale did come out during the summer as the units were being developed. Another problem was the low rate at which good quality computer units could be produced. Those that were produced were only prototypes of potentially good units. Each would need thorough revision and expansion before it would be ready for publication. In addition, the units did not completely cover those areas of the course that the group wanted to have covered. Consequently, additional units will have to be written. Whether the existing units will be useful in the classroom--and whether the teacher will be able to improvise computer work as he goes along (this was the underlying thrust of the work in the computer section)--remains to be seen. Success seems likely at this stage.

The laboratory group collected and processed some new experiments as well as working on the old experiments. They were able to test a few of these during the summer on the students. These experiments will be used and tested by everybody during the fall and winter (1971-1972) to check their effectiveness.

The evaluation work began after the middle of the summer when James Mayo presented a format to be used to collect evaluative techniques. His presentations were followed by the collection and discussion of new test questions. This provided additional items for our test-item pool. Some discussion of additional kinds of questions was begun and some questions making use of photographs taken in the laboratory were examined, along with questions involving students taking data in the laboratory at specially prepared stations. It was decided by the group to develop a second generation of examinations for the physical science group. This would complement the first generation examinations (these resembled in many respects the ACT standardized examination). Computer use was also considered as a possibility for developing examinations, but this has not yet begun.

During the last third of the summer, the teachers decided to devote a good part of their time to working out the background material, philosophy, and a discussion of the units produced by the physical science group. This was part of the overall conception of the course developed during the summer. There was a consensus among the teachers that they had developed a strong physical science course centered around the PSNS textbook. It was now felt that they could continue using the previous course as a base, developing their own unique materials

and bringing additional aspects into the course. Among these, of course, was the computer. The work on this "curriculum package" primarily occupied the last two weeks of the summer and brought it to a hectic close. These materials will now be edited, revised, and expanded by the CRG staff with additional inputs from the teachers. This material will serve as an effective introduction to the course and help prepare people to use the materials effectively.

The relations between the teachers and the CRG staff were generally very successful. One of the main reasons for this was that the summer conference activities were those the teachers themselves had opted for during the previous summer and at the regional conferences. Teachers were also free to choose the area which most interested them, to change if they desired, and to work in more than one area if they wished to do so. The few difficulties that did occur were centered mostly around the new teachers; one had some difficulty understanding what was done, and two others were impatient with the way in which it was being done. It should be added that three other new teachers experienced no difficulty at all and fitted in very well into the program.

The work on the computer, in the laboratory, and in the teaching techniques groups was successful. This was primarily because, as pointed out above, the teachers

were interested in these activities; also it was due to the fact that there was available to the teachers materials, resource personnel, a laboratory, a library of CRG books, an efficient typing staff, and the freedom teachers had to develop their units in their own ways. The work was structured in the sense of definite time allotments and definite deadlines, but the development of a unit was left to the individual teacher. The structure and the format of a unit were not agreed upon until a good part of the summer had passed when they could be carefully examined.

The most unsuccessful aspect of the summer was the failure to integrate some new people, who did not understand or were not sympathetic to our approach, into the program. Near the end of the summer, as things fell into place, these teachers did begin to realize what the program was about and what they had in fact learned.

Treating old and new teachers equally had both advantages and disadvantages. New teachers were made to feel a part of the group and on an equal footing with everyone else, but they did suffer from their ignorance of the history of the program. In particular, some of the issues that they were wrestling with had been discussed at great length at the preconference. For the future, new teachers should be exposed to the new "curriculum package" and given other materials related to the

history of the program prior to the conference. This should help them get oriented more quickly than was the case this summer (1971).

The relationship between the old teachers and the new teachers was basically good; the old teachers easily accepted the new teachers and the work they produced. The old teachers did express some impatience when one of the new teachers objected to the direction the group was taking for reasons that had been considered by the group long before and rejected. It was felt that this new teacher should have waited to comment until he better understood the work that the group had done previously.

Where We Are Now

By the end of the 1971 summer conference, the physical science group had completed the preliminary versions of its "curriculum package." This package includes the history of the physical science group, its evolution, its educational philosophy, methods of evaluation, a flow chart for proceeding through the course, some computer and other units, and some additional laboratory exercises. All of the material is in preliminary form and needs thorough editing before it will be acceptable even as a preliminary version of the work.

Among the materials developed during the summer were several units centered around chemical concepts

including "organic Chemistry," "Classification According to Chemical Properties," and "The Chemical Balance" (a unit involving evaluating chemical formulas by balancing weights representing the elements in such a way that only the correct valences are accepted; this is coupled with a computer tutoring program which checks the student's work and allows him to further investigate possible compounds). There are several units on conservation of momentum, the energy in a pendulum (with related computer activities), the kinetic theory of gases, geology, wavelength, motion, and others. Most of these involve computer activities as an integral part, although some of them can be used either with or without a computer. In addition to these units directly related to the materials covered in the course, there are units relating to the background of the course and of physical science in general. "The Relevance of Science" and the "Place of Geology in the Physical Science Program" are among these. There is also a set of materials describing over 20 experiments--some old and some new--and discussions.

It is anticipated that during the fall and winter, 1972, the teachers and CRG staff will finish developing the computer and other units to complete the course in accord with the overall conception of previous units. The group also hopes to make progress on the evaluation materials and the laboratory materials. If this takes

place satisfactorily, then at the beginning of next summer, the summer of 1972, the group will be in a position to make final corrections and final additions to the curriculum package. The group hopes to then turn its attention to the question of implementing the course at participating schools as well as new ones.

The organization and a schedule of the Physical Science Summer Conference can be found in Appendix I.

Methods of Assigning Participants to the Program

Participants of the Thirteen-College Curriculum Program in science for the most part had been previously employed by the college or university at which they now teach.

All entries into the program were based on four methods: of the 55 participants in the science area, 37 were assigned with prior consultation; only four were assigned without prior consultation. The following table (1) shows each participant's major teaching area and the method of assignment to the program.

Participants in the TCCP, in science, constituted two major areas of science: biology and physical science, thirty-two in the area of biological science and 23 in the area of physical science. Racially, 32 of the participants were black, 15 white, one Indian, six oriental and two did not indicate a classification. Of the 55

Table 1. Major teaching area and method of assigning participants to the program.

Major Area	Volunteered or Applied	Assigned with Prior Consultation	Assigned without Prior Consultation	Recruited from Outside the College	Total No. of Parti- ci- pants
Biology Science	4	21	3	4	32
Physical Science	3	16	1	3	23

participants, 22 were females and the rest were males. Four females were in the area of physical science compared with 20 males. Eighteen females were in the area of biological science as compared to 15 males.

All the participants assigned to the program were college graduates who had attained at least a bachelor's degree: four held bachelor's degrees, thirty-five held master's degrees, and sixteen held Ph.Ds. Table 2 shows the participants' major teaching area and the number of degrees held in each category.

Participants' ages were estimated on the basis of their date of birth. The largest number of participants were born between the years of 1936 and 1940; none were born before the year 1910. Table 3 shows the participants' major teaching area and an estimation of year of birth in each category.

Twenty-one of the participants held the rank of instructor which made up the largest group; one was a graduate student without rank, and one had no rank designated. Table 4 shows participants' major area of teaching and rank.

Seven participants had not taught on the college level prior to assignment to the program. The majority (17) had taught on the college level from three to five years. Only one had taught more than 20 years. Table 5 shows the participants' major teaching area and an

Table 2. Major teaching area and highest degree held by participants.

Major Area	B.S.	M.S.	Professional Diploma or Certificate	Ph.D.	Other
Biological Science	1	23	0	8	0
Physical Science	3	12	0	8	0

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Table 3. Major teaching area and an estimation of data of birth of each participant.

Major Area	1910 or before	1911- 15	1916- 20	1921- 25	1926- 30	1931- 35	1936- 40	1941- 45	After 1945
Biological Science	0	0	0	1	4	7	12	6	2
Physical Science	0	1	2	3	1	3	10	2	1

Table 4. Major teaching area and professional rank held.

Major Area	Instructor	Assistant Professor	Associate Professor	No Rank Designated	Graduate Student	Other
Biological Science	17	9	3	0	0	0
Physical Science	4	8	6	3	1	0

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Table 5. Major teaching area and participants' number of years teaching at the college level.

Major Area	None	1 Year	2 Years	3-5 Years	6-10 Years	11-20 Years	More Than 20 Years
Biological Science	4	3	4	10	5	5	1
Physical Science	3	4	0	7	3	6	0

estimation of the number of years taught on the college level.

Ten participants had not previously taught at the college or university at which they were to teach beginning fall term, 1971. Eleven participants had taught two years at the college they were to teach at the beginning of fall term, 1971. Eight had taught ten years or more at the college they were to teach beginning fall term, 1971. Table 6 shows participants' major teaching area and the number of years taught at the college or university in which he proposed to teach at the beginning of fall term, 1971.

Of the 55 participants, 48 were beginning their first year in the program. None had been in the program from the beginning. The following table (7) shows participants' major teaching area and number of years in the program.

Within the Thirteen-College Curriculum Program there were six adjunct groups to which participants were assigned. Twenty-three participants composed the original Thirteen-College Curriculum Group; seven were in the Five-College Consortium. Table 8 shows major teaching area and the assignment of participants to the selected college or university group.

Table 6. Major teaching area and number of years participants taught at the college or university he proposes to teach at beginning fall term 1971.

Major Area	New to College or University	2nd Year	3rd Year	4th Year	5th Year	6-9 Years	10 or More
Biological Science	6	5	6	4	3	4	4
Physical Science	4	4	2	2	5	2	4

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Table 7. Major teaching area and number of years participation in the Thirteen-College Curriculum Program (in 13-college, 8-college, and 5-college consortiums and extended 13-college consortium).

Major Area	1st Year	2nd Year	3rd Year	4th Year	5th Year
Biological Science	27	4	1	0	0
Physical Science	21	1	0	1	0

Table 8. Major teaching area and assignment of participants to the selected groups.

Major Area	Selected Groups						
	13- College	5- College	8- College	3- University	Extended- 13	Extended- 5	Other
Biological Science	13	2	7	0	7	0	0
Physical Science	10	5	6	0	2	0	0

Table 9. Major teaching area and the required number of contact hours with students per week.

Major Area	3 hours	6 hours	10 hours	12 hours	15 hours	18 hours	More than 18 hours
	3 hours	6 hours	10 hours	12 hours	15 hours	18 hours	More than 18 hours
Biological Science	0	2	19	4	0	0	0
Physical Science	0	2	12	2	5	2	0

Table 10. Major teaching area and amount of formal science training (in quarter hour credit).

Major Area	9 hours or less	18-24	25-32	33-45	46-50	61-90	19 or more
Biological Science	0	2	3	2	3	2	20
Physical Science	0	0	2	2	4	4	11

Sources of Participant Data

Data were collected by means of questionnaires and tests. Each of these sources of data collection is discussed in the following paragraphs.

Pre-questionnaire

The pre-summer questionnaire was administered at the beginning of the second week of the summer conference, July 12, 1971. This questionnaire was constructed by the investigator with the aid of two staff members of the Curriculum Resource Group (CRG), a component of the Institute for Services to Education (ISE). The questionnaire was designed to measure teachers' attitudes and attitude changes toward the TCCP in science. 1-4, five-level response scale from 1 to 5, and seven-level scale, 1 to 7. This was done for all items, except for items on the four-level scale: 46, 49, 52, 54, items 55-60, 62, 64-66, and item 69; on the five-level scale, items 21, 23, 40-46, 49, 51-61, 64 and 65; on the seven-level scale, items 80-84. The highest level (4) on the four-level scale, (5) on the five-level scale and (7) on the seven-level scale were found at the right. For those exception items, the ranking was reversed. Item 20 was a "yes" or "no" type of response.

This questionnaire had been used in succeeding years beginning with the summer of 1967 by the evaluation

staff of ISE; however, no reliable information was available prior to the conference held in the summer, 1971.

The reliability established on the instrument was obtained from the 1971 TCCP summer conference participants' responses. The reliability coefficients on the six scales, employing the Hoyte method of estimating the internal consistency, range from .54 to .71.

Copies of the questionnaires and the analysis of questionnaires for each group of items can be found in Appendices F and G.

Post-questionnaire

The post-questionnaire was mailed to each participant of the biological and physical science groups near the end of the first teaching term (quarter or semester) a participant had taught on January 11, 1972. The post-questionnaire was the same as the pre-questionnaire in design and structure, except for the addition of one item (item 22--requested an estimation of the number of quarter hours of formal science training).

Sequential Test of Educational Progress Science Form 1 Series II

The Sequential Test of Educational Progress, Science Form 1, Series II was administered near the beginning of the summer conference on July 22, 1971. This published test was a 75-item multiple-choice test designed

to measure the ability of the participant to use scientific knowledge to solve problems. The Technical Report gives a reliability score of .80 and a standard error of measurement of 3.2. Raw score distribution and an item analysis of the test can be found in Appendix B.

Conference Assessment Questionnaire

The Conference Assessment Questionnaire was administered three days prior to the end of the summer conference, August 10, 1971.

The questionnaire consisted of 78 items. Of these 78 items, 14 asked for personal information, such as age, sex, etc. These 78 items were divided into two categories: category 1 assessed the summer conference's effectiveness toward teachers' attitudes toward curriculum development, teaching strategies, implementation, attitudes toward consultants' help and responsibilities, and category 2 assessed the teachers' attitudes toward support personnel and the mechanics of the conference operations.

An analysis of this questionnaire completed by the participants is reported in Chapter IV; a copy of the questionnaire may be found in Appendix C.

Procedures for the Analysis of Data

All data were coded and placed on data coding forms by the writer. The coding transformed all responses into numerical form. Personnel of the research consulting center and computer laboratory services employed at Michigan State University aided in the transfer of coded data to keypunch cards and verification of the results. Specialists in application of computer programs adapted existing programs to the needs of the researcher and submitted the data to the Control Data Corporation 3600 and 6500 computers for tabulation and analysis.

The STEP test administered about the second week of the summer conference was scored. Raw scores were converted to percentile rank and standard scores. Items were analyzed for difficulty and discrimination at the Michigan State University Scoring Service. The results of item analysis can be found in table form in Chapter IV. The faculty pre- and post-conference assessment questionnaires were scored and double-checked by hand.

Summary

Data relevant to teachers' attitudes and attitude changes toward the TCCP in science were collected via pre- and post-questionnaires. Also the questionnaire collected personal information. Data used to measure teachers' competency was collected via the STEP test. Teacher

assessment of the summer conference was via the Conference Assessment Questionnaire.

The study of the 55 teachers began with the TCCP Summer Conference in July, 1971, and continued through January, 1972.

All data were coded by the writer, transferred to keypunch cards by trained keypunch operators, and tabulated and analyzed by Control Data Corporation 3600 and 6500 computers.

CHAPTER IV

INTRODUCTION

The major prupose of this chapter is to present the results obtained from the instruments used to collect teacher data as described in Chapter III, as well as the results of the hypotheses tested. The results of STEP test, part one and part two, are presented first. Presented second are the results of the faculty questionnaire administered near the beginning of the summer conference and the same questionnaire administered in January, after one term of implementing the innovative science curriculum. Next are presented the results of the faculty assessment of the summer conference, administered near the end of the summer conference, and finally the results of the testing of the hypotheses.

Analysis of Data

Results of Sequential Tests of Educational Progress

This test was administered only once, near the beginning of the summer conference. The test was divided into two parts. Part one consisted of 40 items and part

two contained 35 items with an overall total of 75 items. The mean score for part one was 31.2 and a standard deviation of 8.1; part two mean score was 19.6 and a standard deviation of 6.2 for the entire population.

Mean scores, standard deviations for each group separately, and means and standard deviations across the entire population sample are given along with scoring keys for both parts in the appendices in addition to individual raw, percentile, and standard scores.

Demographic Data

Data pertaining to the teachers' age, sex, teaching experience, classload and science training were obtained from the faculty questionnaire.

Data concerned with age range and teaching experience were reported in Tables 3 and 5 of Chapter III. From the sample population of 55 teachers, twenty-two (22) were females, and thirty-three (33) were males. Classload (number of contact hours per week with students) means was ten (10) contact hours per week, and formal science training mean range was 61-90 quarter hours.

The Thirteen-College Faculty Questionnaire

The pre-questionnaire was administered at the conclusion of the second week of the 1971 summer conference. The instrument was designed to sample teachers' attitude toward the teaching-learning process and other

factors related to education. The measurement of teachers' attitudes was based on six sub-scales, each was rated from one to seven, with a few exceptions, seven being the highest. Those exceptions are described in detail in Chapter III.

Table 9 contains thirteen (13) significant correlated variables obtained by employing the Pearson Product-Moment of correlation. A simple correlation matrix across the total fifteen variables is listed in Appendix K.

Possible range of scores for scale one, Teachers' Attitudes Toward Students, was from a minus one hundred and fifty-five to a plus one hundred and fifty-five. The second scale, Teachers' Attitudes Toward Teachers and Teaching Methodologies, ranged from a minus two hundred and eight to a plus two hundred and eight. Teachers' Attitudes Toward the College Where They Taught, the third scale, had a possible range of from a minus sixty-four to a plus sixty-four. The fourth scale, Teachers' Attitudes Toward the TCCP Summer Conference, due to some confusion subsequently resulted in a very low response, the writer decided not to report the scores for this scale in sequence in this section of the study; however, those scores are reported as scores obtained from the teachers' assessment of summer conference which follows this report. Teachers' Attitudes Toward Curriculum Innovations,

1. Summer conference mechanics
2. Attitude toward teaching
3. Attitude toward college
4. Attitude toward curriculum
5. Attitude toward administration
6. Sub-matter area
7. Classload (number of contact hours)
8. Amount of formal science training

STEP 1	STEP 2	SUMATT	SUMMEC	ATTSTD	ATTCH	ATTCOL	ATTCUR
SUMMEC		0.316416*					
ATTCH	0.271140*						
ATTCOL		0.324956*					
ATTCUR				0.482183*		0.462445*	0.307042*
ATTADM						0.444691*	0.440925*
SUBARE	0.279747*						
CLLOAD				0.327445*	0.396230*		
SCITRN	-0.343462*						

* $\gamma = 0.26$ at $P \leq .05$

1. Summer conference mechanics
2. Attitude toward teaching
3. Attitude toward college
4. Attitude toward curriculum
5. Attitude toward administrators
6. Sub-matter area
7. Classload (number of contact hours with student per week)
8. Amount of formal science training

possible scores ranged from minus sixty-nine to plus sixty-nine, and Teachers' Attitudes Toward Administrators, possible scores ranged from a minus fifty-eight to a plus fifty-eight, with a total score across the five scales ranging from a minus four hundred and forty-seven to plus four hundred and forty-seven.

The mean scores for both pre-and post-questionnaires along with the change scores on each of the six scales are listed in Tables 10 and 11. Scores for each individual teacher on both the pre- and post-questionnaire across the six scales are listed in Appendix D and E.

Data Related to Testing of the Hypotheses

The hypotheses tested were related to the two (2) major purposes of this study. The first was to ascertain the science teachers' attitude change toward an innovative science curriculum. The second major purpose was to ascertain what variable might be germane to teachers' attitude change toward an innovative science curriculum.

The results of the analysis are presented after the statement of the hypothesis for each section. A discussion and summary of the findings are presented at the end of the chapter. Each of the hypotheses are stated in the null form.

Possible range of scores for scale one (1), teachers attitude toward students, was from a minus one

Table 12. Table of pre- and post-attitudinal mean scores.

	Attitude toward Students	Attitude toward Teaching	Attitude toward College	Attitude toward Curriculum	Attitude toward Adminis- trators
<u>Pre Scores</u>					
Biological Science Teachers	95.26	114.65	33.08	36.91	28.91
Physical Science Teachers	93.87	115.09	40.25	35.56	31.06
<u>Post Scores</u>					
Biological Science Teachers	99.30	124.69	34.65	37.82	27.91
Physical Science Teachers	101.09	125.50	39.15	37.46	31.12
<u>Change Scores for Total Group</u>	5.89	10.25	0.018	1.49	-0.38

Table 13. Table of attitudinal mean scores across both biological and physical science teachers.

	Attitude toward Students	Attitude toward Teaching	Attitude toward College	Attitude toward Curriculum	Attitude toward Adminis- trators
Pre-scores	94.45	114.90	37.25	36.12	30.16
Post-scores	100.34	125.16	37.27	37.61	29.78

hundred and fifty-five (155) to a plus one hundred and fifty-five. The second sub-scale, teachers attitude toward teaching and teaching methodologies, had a possible range from a minus two hundred and eight (208) to plus two hundred and eight. Teachers attitudes toward the the college where they taught, the third scale, had a possible range from minus sixty-four (64) to plus sixty-four. The fourth scale, teachers attitudes toward the TCCP Summer Conference, because of much confusion and a very low response on this subscale, as originally designed, a separate scale was constructed to measure teachers' attitude for this section of the study. The faculty conference assessment questionnaire used was composed of two subscales. Subscale one (1) was designed to measure teachers' perceptions of their interaction with one another, the consultants and the equipment and materials. Subscale two (2) was designed to obtain the teachers' reactions to the actual operation or mechanics of the summer conference. Detail information concerning the instrument was reported in Chapter III. Mean scores for one subscale were 87.32, standard deviation 19.3 for part 1; part 2 mean score was 42.0 and a standard deviation 10.3. Scores for each individual teacher, the percentage and mean scores for each item are listed in Appendix F.

The statistical model of analysis employed in this study involved a multivariate, multiple regression analysis predicting five (5) dependent variables from a combination of ten (10) independent variables.

The means range scores for the six demographic variables are listed in Chapter III.

Table 14 gives the means and standard deviations of each non-demographic variable across the entire sample of the 55 teachers involved in the study.

The model for the multiple regression is:
 $Y = X B + E$. E is assumed to be distributed in the following manner: $E \sim N (1 \ 0 \ 0; I \ 0 \ \Sigma)$.

Thus $\hat{B}$ could be obtained by the following formula:
 $\hat{B} = (X' X)^{-1} X' Y$. For the particular computer program employed in this analysis, the B is determined based on mean deviation scores. The raw regression coefficients ($\hat{B}$) are listed in Appendix I.

The standard errors associated with the raw regression coefficients are listed in Appendix J. These standard errors indicate how precisely the B coefficients have been measured. Totals of the standardized regression coefficients--independent X dependent variables are listed in Appendix L.

Table 15 gives the conditional variance and standard deviation of the dependent variables. These are

Table 14. Table of means and standard deviations of non-demographic variables across entire sample.

Variable	N = 55	Means	S.D.
Attitude toward summer conference-1		87.32727	9.3113
Attitude toward summer conference-2		42.05455	10.3770
Attitude toward student		5.89091	14.6587
Attitude toward teacher		10.25455	13.2024
Attitude toward college		0.01818	8.8097
Attitude toward curriculum innovation		1.49091	7.6712
Attitude toward administrators		-0.38182	9.1722

the variance estimates after the ten (10) independent variables have been partialled out.

Table 16 gives the matrix of correlations after the effect of the ten (10) covariants have been partialled out.

Table 17 gives the regression analysis with the ten covariates eliminated. These are the variance estimates after the independent variables have been partialled out.

The result of the Chi Square test for the hypotheses of no association between dependent and independent

Table 15. Table of conditional variance and standard deviation.

Variable	Variance	S.D.
Attitude toward student	190.978534	13.8195
Attitude toward teacher	159.384312	12.5851
Attitude toward college	80.696425	8.9831
Attitude toward curriculum innovation	57.843363	7.6055
Attitude toward administrators	91.399301	9.4603

variables was overall nonsignificant. $\chi^2 = 56.86$, d.f. = 50, $P \leq 0.23$.

To accept a probability of less than .23 as an unlikely event, a further investigation of the data would include examination of the multiple-regression correlation coefficients. These are presented in Table 15.

It will be noted from Table 17 that the independent variables are best able to predict attitude toward student, teaching, and curriculum, and somewhat less toward college and administration.

Mentioned previously, the Chi Square test for hypothesis of no association between dependent and independent variables was nonsignificant; however, in examining the stepwise contribution of each independent variable resulted in several significant relationships.

Table 16. Table of correlation matrix with covariates eliminated.

	Attitude toward Students	Attitude toward Teaching	Attitude toward College	Attitude toward Curriculum	Attitude toward Adminis- trators
Attitude toward students	1.000000				
Attitude toward teaching	0.081723	1.000000			
Attitude toward college	0.259473	0.000126	1.000000		
Attitude toward curriculum	0.527577	0.420301	0.363287	1.000000	
Attitude toward administrators	0.143292	0.146206	0.558507	0.381500	1.000000

Table 17. Table of statistics for regression analysis with 10 covariates eliminated.

Variable	Mult. R	Square Mult. R
Attitude toward student	0.5252	0.2758
Attitude toward teacher	0.5095	0.2596
Attitude toward college	0.3909	0.1528
Attitude toward curriculum innovation	0.4462	0.1991
Attitude toward administrators	0.3388	0.1148

Testing the Hypotheses

This study involved the analysis of five dependent variables and ten covariates using the multivariate, multiple regression analysis model.

Results of Sex Analysis

H_{O_1} : There is no significant correlation among teachers' attitude scores toward an innovated science curriculum due to whether they were male or female.

The computed Chi square value was 0.75, d.f. = 5, score associated with this value was .98. The null hypothesis was not rejected.

Results of Major Science Area Analysis

HO₂: There is no significant correlation between teachers' attitude score changes and their major teaching area.

Of the total fifty-five (55) participants, twenty-three (23) of them had science training backgrounds in the physical science and thirty-two (32) indicated training in the biological science area.

The Chi square value which resulted from the analysis of these data was $\chi^2 = 4.87$, d.f. = 5, $P \leq .43$. This value was too large to allow rejection of the null hypothesis.

Results of Science Training Analysis

HO₃: There is no significant correlation in teachers' attitude scores change as related to the amount of formal science training.

The mean range for the total fifty-five (55) teachers relative to the number of years of teaching at the college level was from three to five years. This hypothesis was rejected as a result of analysis using the Chi square test. $\chi^2 = 12.97$, d.f. = 5, and $P \leq .02$. In examining the univariate F's associated with the science training variable, it was found that most of the relationship was primarily between attitude toward college and in a lesser degree attitude toward curriculum innovation with science training variable.

HO₄: There is no significant correlation between teachers' attitude score change due to the number of years of teaching.

The results of analysis of this variable indicated no significant correlation; therefore, the null hypothesis was accepted.

Results of Classload Analysis

HO₅: There is no significant correlation between teachers' attitude score changes due to the number of contact hours per week with students.

The results of the analysis of this variable indicated a significant correlation. Using the Chi square test, $\chi^2 = 9.58$, d.f. = 5, $P \leq 0.08$. This was small enough to allow for the rejection of the hypothesis.

Results of STEP Test Analysis

HO₆: There is no significant correlation between teachers' attitude scores change due to their knowledge of science.

Mean score of fifty-five (55) teachers for part one (1) of the STEP test was 31.2 and part two (2) mean score was 19.6. The Chi square test for part one (1) was $\chi^2 = 5.18$, d.f. = 5, $P \leq 0.39$, and for part two (2), $\chi^2 = 1.94$, d.f. = 5, $P \leq .85$, the significant level 0.2367 at .05 percent. This being the case, the hypothesis was accepted. The scores for each individual of the population are listed in Appendix B.

HO₇: There is no significant correlation between teachers' attitude score change relative to age.

Teachers mean age ranged as indicated on the faculty questionnaires, were thirty-six to forty years. Using step-wise regressing analysis indicated a $\chi^2 = 4.46$, d.f. = 5, $P \leq 0.48$. This value was too large to reject this hypothesis.

HO₈: There is no significant correlation between teachers' attitude change as a result of having participated in 1971 summer conference.

The summer conference attitudinal scale was divided into two subscales. Subscale one (1) was actually designed quantitatively to predicate the teachers' perceptions of their interaction with one another, the consultants, the materials and equipment, and the philosophy of TCCP. Part two (2) had to do only with the operation or mechanics of the summer conference.

Applying the Chi square test, $\chi^2 = 14.4$, d.f. = 5, $P \leq 0.01$ was significant for part one (1) of the attitudinal scale which measured the most important aspect of the summer conference relative to the teachers of science. On the other hand, the Chi square test for part two did not indicate any significant relationship, and as mentioned earlier was only used to measure the teachers' perceptions of the summer conference operations which the writer felt of relatively little importance. On the basis of Chi square test results and significant level of 0.05 percent

the hypothesis was rejected. Observing the univariate F, the variable that seems to have contributed most to the correlation is that of attitude toward college, having a $P \leq 0.15$.

Summary

The Sequential Test of Educational Progress and the Summary Conference Assessment Questionnaire were administered once during the study. The STEP test was administered near the end of the second week of the summer conference and the Summer Conference Assessment Questionnaire was administered near the end of the last week of the summer conference. The scores on both were utilized as teacher attitudinal data for the correlations run to test the hypotheses.

The results of the Faculty Questionnaire from the second week in June near the beginning of the summer conference and late January administering, mean scores indicated a gain across five (5) scales, and one scale, attitude toward administrators, indicated a loss in scores of -0.381. The greatest gain in scores was observed on the Attitude Toward Teaching scale with a gain of 10.25.

The hypotheses tested involved in this study are divided into two (2) areas: (1) the relationship of teachers' attitude changes toward student, teaching and

teaching methodologies, toward the college or university which they taught, institutions' policies and administrators, curriculum and curriculum development, and toward the Thirteen-College Curriculum Program In-Service Summer Conference, and (2) the relationship of demographic variables and teachers' attitude changes. These variables included the amount of formal science training, teaching experience, science knowledge, classload (the number of contact hours per week), sex and major teaching area. Table 18 shows a summary of all the pertinent findings of this study.

Table 18. Summary of Findings.

Tested for the	Results Based upon $\alpha = .05$	Comment
1. Relationship between teacher attitude scores toward an innovative science curriculum and sex.	No significant relationships.	N = 55
2. Relationship between teachers' attitudes scores toward an innovative science curriculum and their major science teaching area (biological and physical).	No significant relationships.	N = 55 N = 32* N = 23* Questionnaire administered in June and January.
3. Relationship between teachers' attitudes scores toward an innovative science curriculum and the amount of formal training in science.	Significant	Results significant for correlation between teachers' attitudes scores toward an innovative science curriculum and the amount of formal science training. The univariate F indicated the scores on <u>attitude toward curriculum subscale</u> contributed most of the significance.
4. Relationship between teachers' attitude scores toward an innovative science curriculum and the number of years of teaching at the college level.	No significant relationships.	N = 55 Questionnaire administered in June and January.

Table 18. Continued.

Tested for the	Results Based upon $\alpha = .05$	Comment
5. Relationship between teachers' attitude scores toward an innovative curriculum and classload number of contact hours per week.	Significant relationships.	N = 55 Results significant for correlation between teachers' attitudes scores toward an innovated science curriculum and number of contact hours per week with students. The univariate F indicated the scores on the subscale, <u>attitude toward students</u>, contributed most significantly. Questionnaire administered in June and January.
6. Relationship between teachers' scores on STEP test (part one and two) and their attitude scores toward an innovative science curriculum.	No significant relationships.	N = 55 N = 32* Mean score part 1, 29.9 Mean score part 2, 17.6 N = 23** Mean score part 1, 32.2 Mean score part 2, 21.0
7. Relationship between teachers' attitudes scores toward an innovative science curriculum and their chronological age.	No significant relationships.	

Table 18. Continued.

Tested for the	Results Based upon $\alpha = .05$	Comment
8. Relationship between teachers' attitudes scores of the summer conference and attitudes scores toward an innovative science curriculum.	Significant	N = 55 Results significant for correlation between teachers' attitudes scores toward an innovative science curriculum and summer conference attitude scores, part 1. This significant indicated contribution coming mostly from the scores on the subscale, <u>attitude toward college.</u>

*Indicates biological science teachers.

**Indicates physical science teachers.

CHAPTER V

CONCLUSIONS AND IMPLICATIONS

The purpose of this study was to determine the possible relationships of a selected group of attitudinal and demographic variables, exhibited among a selected group of college teachers, toward an innovative science curriculum.

Review of the Literature

An exhaustive search of pertinent literature revealed a lack of research involving college teachers; this search underlies a need for such research.

Design of Study

The study involved fifty-five (55) college teachers assigned to the Thirteen-College Curriculum Program. Data obtained from these teachers began with the summer conference training program, the summer of 1971. The attitudinal variables selected for this study were: (1) attitude toward teaching, (2) attitude toward the college or university in which they taught, (3) attitude toward curriculum innovations, (4) attitude toward school policies and administrators, (5) attitude

toward students, and (6) attitude toward the TCCP Summer Conference Training Program.

The demographic variables were: (1) age, (2) years of college teaching experience, (3) sex, (4) subject-matter area, (5) knowledge of science, and (6) class load (number of contact hours per week). The instruments utilized to collect the data were: (1) STEP test, science (parts I and II), (2) Faculty Questionnaire, and (3) Faculty Summer Conference Assessment Questionnaire.

The Summer Conference Training Program was designed to acquaint the participants with the Thirteen-College Curriculum Program, an innovative science curriculum. Following the training program, the teachers taught the innovative science curriculum during the 1971-1972 school year. The Faculty Questionnaire and STEP tests were administered during the second week of the summer conference. The same faculty questionnaire was administered again in January, after the teachers had taught the curriculum for one term (quarter or semester). The faculty assessment questionnaire was administered only once, near the end of the summer conference.

Analysis of the data involved tabulation, the application of multivariate multiple regression, and the Pearson product-moment correlation coefficient. All computations were carried out on the Control Data Corporation 3600 and 6500 computers.

Hypotheses Tested

The hypotheses tested were that there would be no significant correlations between teachers' attitude change scores and the selected six (6) demographic variables.

Data for each hypothesis tested were required to show significance at the .05 level for rejection of the hypothesis.

Results and Conclusions

Employing the Chi Square test for significance, including a composite treatment of all the variables, the results indicated no significant correlation. But in examining each covariate separately, using the step-wise method indicated several significant relationships.

Hypothesis HO_1 was concerned with the correlation between males and females and their attitude toward an innovated science curriculum. This hypothesis was accepted, indicating that attitude scores were not contingent upon sex.

In Hypothesis HO_2 the relationships between teachers' attitude scores and major teaching areas were investigated. The results indicated no significance. Again, the hypothesis was accepted. The areas represented were biological and physical science. There were thirty-two (32) biological science teachers and twenty-three (23) physical science teachers.

The amount of formal science training and its relationship to the teachers' attitude scores was investigated with hypothesis HO_3 . A significant positive correlation of this variable indicated that the univariate F weighed heavily toward attitude toward curriculum. The hypothesis was rejected. The mean scores for teachers' formal science training ranges from 61-90 quarter hours. Biological and physical science teachers' composite mean scores differed by only 1.5.

Hypothesis HO_4 was used to analyze the teachers' attitude scores and the number of years of teaching at the college level. The results indicated no significant relationships. The mean range was from three to five years of teaching at the college level.

The results of the analysis of the teachers' attitude scores toward an innovated science curriculum and the number of hours they spent in contact with the students was the subject for investigation of HO_5 . The results revealed a significant positive correlation at the .05 level. The univariate F for this variable indicated the subscale, attitude toward students, was the greatest contributor. The difference between mean group post scores of biological and physical science teachers was 1.79 points.

The use of hypothesis HO_6 analyzed the teachers' attitude scores toward an innovated science curriculum and their knowledge of science. Results indicated no significant relationship and the hypothesis was accepted.

However, in analyzing the STEP test scores both groups, biological and physical science teachers, had a comparatively high mean score on both part I and part II of the test. Mean scores for the physical science teachers was higher than the mean scores of the teachers of biology both on part I and part II.

The relationship between teachers' attitude scores and chronological age was tested through hypothesis HO_7 . The results revealed no significant relationships. The hypothesis was not rejected. Mean age ranges were from thirty to thirty-five years.

Hypothesis HO_8 was used to analyze the correlations between teachers' attitude scores of the summer training program and their attitude scores toward an innovated science curriculum. Results indicated a positive significant correlation for part I. Part I was more pertinent to the study than part II. Part II had to do with only the mechanics of the summer conference, involving such things as cashing checks, changing linen, mailing letters, etc. The univariate F subscale, attitude toward college, seemed to have been most influential.

This study indicated that the teachers' sex did not have any significant influence in terms of their perception of an innovated science curriculum. With the composition among female and male being not too unevenly divided, the males dominated the physical science

discipline and the females the biological science discipline. Of the total sample population the females constituted thirty-nine percent of the group.

Even though there were no significant relationships between teachers' attitude toward an innovated science curriculum and their perception of their major teaching area, this may be due in part to their multiple former training. Several teachers indicated their teaching areas as being in two or more of the science areas.

It may be concluded that the amount of formal science training played a significant role as to how teachers perceive an innovated science curriculum. This study indicated a significant relationship between these two variables. A comparatively high number of these teachers held a doctorate degree, precisely twenty-nine percent, which is somewhat unique of small predominately black college faculties. Sixty percent held a master's degree and less than one percent held only the bachelor's degree. Most of them possessed sixty-one or more quarter hours of science training. The majority of the teachers involved in this study were black with initial educational backgrounds from predominately black institutions located in the southern half of the United States. Also, one may infer, until recent years, due to the operation of dual systems of education among institutions of higher education throughout the

south, black teachers were encouraged with such governmental support as the National Science Foundation, to seek advanced training in the sciences. This may account for the relatively large number of advanced degrees in this area and the number of people in college level positions.

This study did not seek information relative to the total amount of teaching experience of the sample population. The mean ranges were for the number of years teaching at the college level which was three to five years. Several negative observations were made; however, these were not significant at the .05 level. There may have been some significant relationships indicated if the questionnaire had not been designed to exclude the other levels of teaching experience.

Most of the faculties of small predominately black institutions of higher education experience monumental class loads. Teachers of this study's population sample indicated a very high significant relationship between their perception of an innovated science curriculum and the number of contact hours per week were indicated by most of them. This number of contact hours was a reduction for most of them compared with the number required outside the program as regular program. This reduced number of contact hours required by the program

seems to have produced a more favorable attitude of perception toward students.

The results of this study help to support those of other studies concerning teachers' knowledge of science and how they perceived innovations in science. The results of this study's findings indicated no significant relationships. Both groups scored comparatively higher than the norms on the STEP test. The test was designed to determine knowledge of science of freshman and sophomore students in college. The mean item difficulty and discrimination may not be valid for the sample population of this study.

The faculties of the sample population were relatively young, with a mean age from thirty to thirty-five years. The findings of this study showed age not to be insignificant. The youngest of faculties may indicate a high turnover rate, which is usual for a small college. Further indication of this were the mean number of years of teaching at the college level and mean number of years taught at the same college, which were three to five and one to two years, respectively.

Many educators express the theory that when teachers are involved in curriculum innovations, a workshop of some type becomes an important activity in enhancing a positive perception of teachers in the change process. The teachers' attitudinal findings in this

study indicated a significant relationship toward the summer conference training. Their attitudes toward the college also were influenced by being involved in the training program. It may be inferred that the teachers were made aware of their freedom to attempt changes or modification in teaching which theretofore did not exist or they were not aware of the existence.

In concluding this study, the writer would like to make reference to a segment of the program in which this study was not designed to investigate.

Students selected for participation in the Thirteen-College Curriculum Program were selected on a random basis on each college campus. This sample population included one hundred students for each of the thirteen college campuses. The students selected were students who had been accepted for admission by the registrar offices of each of the thirteen colleges prior to selecting them for the program.

The students selected for the program were granted a major portion of financial support toward cost for one school year including tuition, room and board, books and materials, and a stipend of five dollars per week.

Thirty-four percent of these students came from families with incomes less than three thousand dollars

per year. Seventy-eight came from families with incomes of less than six thousand and two hundred dollars a year.

More than sixty percent of the program students who entered college in 1967 approach graduation or have graduated as compared to approximately forty-five percent of the regular college students. A comparison of the program students' retention strength with the regular student population is listed in Appendix O. In terms of college grade performance, the program students have done generally better than their peers. A comparison of grade point averages of the program students and the regular students are listed in Appendix P.

By presenting this brief data on students involved in the program, it is hoped that a better insight of the overall program may be conceptualized.

Educational Implications

In view of the findings of this study, the following conclusions seem justified.

1. There is a positive correlation between teachers' attitude and the amount of formal science training relative to a "new" or modified science curriculum. Therefore, the adequacy of formal science training should be examined closely when selecting teachers to implement an innovated science curriculum.

2. When implementing an innovated science curriculum, a reasonable number of contact hours with students should be given consideration.

3. When employing workshops to diffuse and implement an innovation in science, the interactions of teachers among themselves, consultants, materials and equipment should receive priority attention.

Some Dimensions of This Study Which Warrant Further Research

There should be a replication of this study with a control group, one which does not assign teachers to attend a summer conference but were assigned to implement the innovation. The results of an investigation of this kind would supply additional data related to the perceptions of college teachers toward an innovated science program.

Further research of college science teachers using other attitudinal scales might reveal further insights into which variables are the major factors for acceptance or rejection of science innovations.

A replication of this study using beginning freshmen students' achievement in science courses may prove to be a factor of whether teacher attitude toward an innovated science curriculum has validity.

There should be a replication of this study involving a greater number of teachers, to include the mathematics and chemistry teachers. Increasing the population sample would increase the validity of results.

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APPENDIX A

THE THIRTEEN-COLLEGES SUMMER CONFERENCE SCHEDULE
(Biological and Physical Science)

INSTITUTE FOR SERVICES TO EDUCATION
 Biology Summer Institute and Writing Conference
 BISHOP COLLEGE
 Dallas, Texas
 July 6 to August 13, 1971

SCHEDULE

Programs A and B

1st Week

Tuesday, July 6

9:30 Plenary Session
 1:30 Biology Meeting, Room 219 Science
 Registration
 Discussion: "What is the TCCP, the FCC, and
 the ECC?" Biology Staff

Wednesday, July 7

9-10:20 Discussion: "Curriculum Planning--Who's Con-
 cerned?" Discussion Leader, Dr.
 C. M. Goolsby
 10:30-12 Discussion "Teacher Self-Image Related to the
 Desired Teaching Style." Biology
 Staff
 1:30-3:10 Discussion: "Leading and Participating in a
 Discussion." Discussion Leader,
 Dr. D. A. Obasun
 3:30-5 Discussion: "Evaluating Students in the Pro-
 gram." Biology Staff

Thursday, July 8

9 Organization for Succeeding Weeks
 10 Program A Conferences
 11 Program B Conferences
 1:30-5 Conference Demonstrations

PROGRAM B

PROGRAM A

Friday, July 9

9	Conference (Place TBA)	9-10 Group Discussions	10-11 Unit 1
		<u>Group</u>	<u>Room</u>
		A	217 Science
		B	104 "
		C	107 "
		D	214 "
		E	219 "

1:30-5 Conference Demonstrations 1:30 Conference Demonstra-
 tions

SCHEDULE, Biology Summer Institute and Writing Conference
 BISHOP COLLEGE
 Dallas, Texas
 July 6 to August 13, 1971

<u>PROGRAM B</u>		<u>PROGRAM A</u>	
<u>2nd Week</u>			
Monday, July 12 and Tuesday, July 13			
9-11	Lab. Room 107 Sci.	9-11	Lab. Unit 1
	Unit 1		<u>Group</u> <u>Room</u>
	(Taught by teacher	A	217 Sci.
	for Group C, assis-	B	104 Sci.
	ted by Staff.)	C	107 Sci.
		D	214 Sci.
		E	219 Sci.
11-12	Discussion, Unit 1	Teaching Conferences	
	Dr. Obasun, Rm. 214	Room 219 and Reading Area	
	Sci. Conference		
	Demonstrations		
1:30-5	Conference	1:30-5	Conference
	Demonstrations		Demonstrations
Wednesday, July 14 and Thursday, July 15			
9-11	Lab. Room 107 Sci.	1:30-2	Teaching Conferences
	Biology Staff		Rooms 214 and 219
		2-3	Discussions
		3-5	Laboratory
11-12	Discussion Unit 1	<u>Group</u> <u>Room</u>	
	Dr. Obasun	A	101 Sci.
	Room 214 Sci.	B	104 "
		C	107 "
		D	214 "
		E	219 "
Friday, July 16			
9-10	Discussions	11-12	Conferences on New
10-11	Evaluation		Unit Outlines
11-12	Conference on New		(Program B)
	Unit Outlines	1:30-2	Teaching Conferences
		2-3	Discussions
		3-4	Evaluation
<u>3rd Week</u>			
Monday, July 19 through Thursday 22			
9-11	Lab. Room 107 Sci.	1:30-2	Teaching Conferences
	Discussion--Unit 3,	2-3	Discussions
	Dr. Goolsby	3-5	Laboratory
			Room assignments
			same as July 14
Friday, July 23			
Same as Friday, July 16		Same as Friday, July 16	

SCHEDULE, Biology Summer Institute and Writing Conference
 BISHOP COLLEGE
 Dallas, Texas
 July 6 to August 13, 1971

4th Week

Monday, July 26 to Thursday, July 29

9-9:30	Administrative Conference - Room 219	9-9:30	Administrative Conference - Room 219
9:30-12	Assembled work on new units	1-1:30	Teaching Conferences, Rooms 214 and 219
	<u>Unit</u> <u>Room</u>	2-3	Discussions: Units 4, 5, and 8
	9 107		

PROGRAM B

<u>Unit</u>	<u>Room</u>
10	214
11	219
12	104

PROGRAM A
 Laboratory

<u>Group</u>	<u>Unit</u>	<u>Room</u>
A	4	214
B	4	219
C	5	101
D	5	104
E	8	107

Friday, July 30

9-9:30	Administrative Conference	9-9:30	Administrative Conference
9:30-12	Report from writing groups, Room 219	9:30-12	Reports from writing groups (Program B)
		1-1:30	Teaching Conference
		2-3	Discussions
		3-4	Evaluation

5th Week

Monday, August 2 to Friday, August 6
 Same as the 4th week

<u>Group</u>	<u>Unit</u>	<u>Room</u>
A	5	101
B	5	104
C	8	107
D	8	214
E	4	219

6th Week

Monday, August 9

9-9:30	Administrative Conference
9:30-12	Assembled work on units

Monday, August 9 to Wed., August 11

9-9:30	Administrative Conference
1-1:30	Teaching Conference
2-3	Discussions
3-5	Laboratory

SCHEDULE, Biology Summer Institute and Writing Conference
 BISHOP COLLEGE
 Dallas, Texas
 July 6 to August 13, 1971

Tues., Aug. 10 and Wed., Aug. 11

		<u>Group</u>	<u>Unit</u>	<u>Room</u>
9-11	New Unit Discus-	A	8	104
	sions and Labora-	B	8	107
	tories	C	4	214
11	Administrative	D	4	219
	Conference, Room 219	E	5	101

Thursday, August 12

1:30	Colloquium for Pro-	9-10	Discussion
	grams A and B,	10-11	Evaluation
	Room 219		

BIOLOGY STAFF

Dr. Charles M. Goolsby, Senior Program Associate, ISE,
 Biology Conference Director: Room 232 Science
 Building

Dr. Dan A. Obasun, Program Associate, ISE, Assistant
 Director: Room 238, Science Building

Dr. Jonathan T. Harris, Norfolk State College, Program
 Associate, ISE, Room 238 Science Building

Robert J. Anthony, MS., M. Sc.Ed., Jackson State College,
 Program Associate, ISE, Room 236 Science Building

Harold E. Banks, M.Sc., Program Associate, ISE, Room 236
 Science Building

Miss Lucinda Johnson, Secretary, Biology Office - Ext. 286

BIOLOGY SUMMER CONFERENCE AND INSTITUTE, BISHOP COLLEGE,
DALLAS, TEXAS

July 9, 1971

Program A

Group A

1. Mrs. Dorothy Exum, Tennessee State University
2. Mrs. Barbara E. Frisby, Southern University, Baton Rouge
3. Dr. Bhebiem B. Subramanyam, Florida A & M University
4. Mrs. Katherine S. Brossette, Southern University, Baton Rouge

Group B

1. Mrs. Rachel D. Hargrove, Virginia Union University
2. Robert L. Woods, North Carolina A & T State University
3. Mrs. Verna L. Spinks, Alcorn A & M College
4. JoAnn Vicks, Mary Holmes College

Group C

1. Mrs. Linda P. Lipham, Grambling College
2. Glen M. Sponholtz, Florida A & M University
3. Dr. Stanley B. Boertje, Southern University, New Orleans
4. Jackie A. Myster, University of Maryland
5. Mrs. Rose W. Burke, Bishop College

Group D

1. Benny M. Miles
2. Ehsan A. Syed, Bishop College
3. Mrs. Euphoria Higginbotham, Southern University, Baton Rouge
4. Raymond H. Alexander, Norfolk State College

Group E

1. Dr. Wasi M. Siddiqui, Bishop College
2. John F. Johnson, Jarvis Christian College
3. Dr. Senka Yaden, Jarvis Christian College
4. Havord C. Bishop, LeMoyne-Owen College

BIOLOGY SUMMER CONFERENCE AND INSTITUTE, BISHOP COLLEGE,
DALLAS, TEXAS

July 9, 1971

PROGRAM B

Unit 9--Water: Its Physical Chemistry, Biology, Sociology
and Politics

1. Mrs. Lauree F. G. Lane, Tennessee State University
2. Mrs. Portia Hubbard, Southern University, Baton Rouge
3. Thaddeus V. Beasley, Elizabeth City State University

Unit 10--Animal Behavior

1. Dr. Mahendra Singh, Southern University, Baton Rouge
2. Harold W. Toliver, Langston University
3. Mrs. Rebecca Anderson, Southern University, Shreveport, La.

Unit 11--Some Actions of Common Drugs

1. Rather G. Brown, Alabama A & M College
2. Mrs. Eva B. Landers, Tennessee State University
3. Dr. Murthy V. L. N. Pinapaka, Fayetteville State University

Unit 12--Human Reproduction and Its Control

1. Marshall B. Pitts, Fayetteville State University
2. Mrs. Gertrude Wilson, Southern University

Physical Science
1971 Summer Conference Daily Schedule
6th to 9th of July

P.S.1.-1

Mon.	Tuesday	Wednesday	Thursday	Friday
	9:30 Plenary Session [Bishop Chapel]	9:00 <u>Physical Science Meeting</u> a. Program philosophy, objective strategies b. Outline of the Physical Science Course [302 W.R. White Science Building]	9:00 <u>Physical Science Meeting</u> Orientation (continued) [302 W.R. White Science Building]	9:00 Demonstration Classes 10:45 Coffee Break 11:00 Teaching Strategies
	12:00	12:00	12:00	12:00
	1:30	1:30	1:30	1:30
	<u>Physical Science Meeting</u> Greetings General Orientation [302 W.R. White Science Building]	<u>Physical Science Meeting</u> Overview of the Summer Conference [302 W.R. White Science Building]	<u>General Orientation Conference</u> [See special instruction sheet to location]	<u>General Orientation Conference</u>
	5:00	5:00	5:00	5:00

Physical Science
1971 Summer Conference Daily Schedule
12th - 16th July

P.S.1.1.-2

Monday	Tuesday	Wednesday	Thursday	Friday
9:00 Demonstration Classes	9:00 General Meeting	9:00 Demonstration Classes	9:00 Seminar	9:00 Demonstration Classes
10:45 Coffee Break	10:45 Coffee Break	10:45 Coffee Break	10:00 Implementation Workshop	10:45 Coffee Break
11:00 Teaching Strategies	11:00 Conference with Project Leaders	11:00 Teaching Strategies	11:00 General Meeting	11:00 Teaching Strategies
12:00	12:00	12:00	12:00	12:00
1:30 General Orein- tation Con- ference [See Special Instruction Sheet for location]	1:30 General Orien- tation Con- ference	1:30 Individual Writing	1:30 Research and Development	1:30 Individual Writing
5:00	5:00	3:30 Group Meeting on Projects	5:00	3:30 Group Meeting on Projects
		5:00		5:00

Physical Science
Summer Conference Daily Schedule
July 19 - August 13

P.S.1.1.-3

Monday	Tuesday	Wednesday	Thursday	Friday
9:00 Demonstration Classes	9:00 Seminar	9:00 Demonstration Classes	9:00 Seminar	9:00 Demonstration Classes
10:45 Coffee Break	10:45 Coffee Break	10:45 Coffee Break	10:45 Coffee Break	10:45 Coffee Break
11:00 Discussion of Demonstration and Teaching Strategy - Problem Solv- ing	11:00 General Meeting	11:00 Discussion of Demonstration and Problem Solving	11:00 General Meeting	11:00 Discussion of Demonstration and Problem Solving
12:00	12:00	12:00	12:00	12:00
1:30 Individual Writing	1:30 Research and Development	1:30 Individual Writing	1:30 Research and Development	1:30 Individual Writing
3:30 Group Meeting on Projects		3:30 Group Meeting on Projects		3:30 Group Meeting on Projects
5:00	5:00	5:00	5:00	5:00

PROJECT ASSIGNMENTS

I. Development of Chemistry Experiments to Augment Chemistry Unit

1. Ralph Turner (Leader)
2. Newtie Boxd
3. Kumar Chatterjee
4. Walter Floyd
5. Melvin Gadson
6. L. Lin
7. Charlie Scott
8. Adell Mills
9. James Fennessey
10. Thomas Williams

II. Computer

1. Army Daniel (Leader)
2. James Fennessey
3. James Tyson
4. Donald Volz
5. Charles Phillips
6. Melvin Gadson

III. Measurement

1. Lee Colquitt (Leader)
2. R. K. Mathur
3. Larry Mattrix
4. James Tyson
5. Donald Volz
6. Leon Punsalan

IV. Extensions to Interdisciplinary Bio-Chemical Problems

1. R. Mathur (Leader)
2. Cynthia Huff
3. Lydia Cummings

V. Special Projects in Chemistry

1. Margaret Knighton
2. Curtis Higgenbotham

VI. Extensions in Physics

1. Lee Colquitt (Leader)
2. Adell Mills
3. Leon Punsalan
4. Thomas Williams

VII. Video Tape

1. Lee Colquitt (Leader)
2. Charlie Scott
3. Adell Mills
4. Cynthia Huff
5. Babu Jain

APPENDIX B

INDIVIDUAL TEACHER'S STEP TEST SCORES, RAW SCORE
DISTRIBUTION, MEAN, STANDARD DEVIATION, VARIANCE,
STANDARD SCORE MEAN, STANDARD DEVIATION, SUMMARY,
ITEM ANALYSIS KEY, ANSWER KEY FOR BOTH PART I AND
II FOR ALL TEACHERS N = 55

Teacher Number	Raw Score	Percentile Rank	Standard Score
1	32	48	50.8
2	29	35	47.1
3	38	80	58.1
4	24	14	41.0
5	23	10	39.7
6	40	88	60.6
7	28	28	45.9
8	36	66	55.7
9	35	61	54.5
10	18	5	33.6
11	30	39	48.3
12	29	35	47.1
13	35	61	54.5
14	23	10	39.7
15	5	1	17.6
16	28	28	45.9
17	37	74	56.9
18	37	74	56.9
19	30	39	48.3
20	18	5	33.6
21	26	21	43.4
22	32	48	50.8
23	42	94	63.0
24*	30	39	48.3
25	25	18	42.2
26	33	53	52.0
27	24	14	41.0
28	37	74	56.9
29	25	18	42.2
30	28	28	45.9

Teacher Number	Raw Score	Percentile Rank	Standard Score
31	33	53	52.0
32	31	43	49.5
33	34	57	53.2
34	43	97	64.3
35	36	66	55.7
36	39	85	59.4
37	41	91	61.8
38	28	28	45.9
39	31	43	49.5
40	28	28	45.9
41	5	1	17.6
42	33	53	52.0
43	39	85	59.4
44	44	99	65.5
45	19	7	34.8
46	25	18	42.2
47	32	48	50.8
48	36	66	55.7
49	39	85	59.4
50	28	28	45.9
51	41	91	61.8
52	38	80	58.1
53	36	66	55.7
54	37	74	56.9
55	37	74	56.9

*Indicates 1 through 23 are physical science teachers and 24 through 55 are biology teachers.

Teacher Number	Raw Score	Percentile Rank	Standard Score
1	18	31	48.2
2	23	66	56.3
3	19	45	49.8
4	16	30	45.0
5	18	37	48.2
6	21	59	53.1
7	20	53	51.4
8	23	66	56.3
9	23	66	56.3
10	8	8	32.1
11	8	8	32.1
12	7	2	30.5
13	20	53	51.4
14	12	13	38.6
15	7	2	30.5
16	8	8	32.1
17	26	84	61.1
18	14	22	41.8
19	21	59	53.1
20	7	2	30.5
21	19	45	49.8
22	24	72	57.9
23	26	84	61.1
24*	18	37	48.2
25	16	30	45.0
26	27	93	62.7
27	13	17	40.2
28	27	93	62.7
29	15	26	43.4
30	20	53	51.4
31	20	53	51.4

Teacher Number	Raw Score	Percentile Rank	Standard Score
32	27	93	62.7
33	18	37	48.2
34	26	84	61.1
35	26	84	61.1
36	24	72	57.9
37	28	98	64.3
38	19	45	49.8
39	18	37	48.2
40	26	84	61.1
41	8	8	32.1
42	13	17	40.2
43	24	72	57.9
44	28	98	64.3
45	16	30	45.0
46	15	26	43.4
47	14	22	41.8
48	23	66	56.3
49	26	84	61.1
50	20	53	51.4
51	26	84	61.1
52	26	84	61.1
53	13	17	40.2
54	25	76	59.5
55	22	62	54.7

*Indicates 1 through 23 are physical science teachers and 24 through 55 are biology teachers.

Part I, 45 Items

Raw Score	Frequency	Cumulative Frequency	Percentile Rank	Standard Score
44	1	1	99	65.5
43	1	2	97	64.3
42	2	4	94	63.0
41	2	6	91	61.8
40	1	7	88	60.6
39	3	10	85	59.4
38	2	12	80	58.1
37	5	17	74	56.9
36	4	21	66	55.7
35	2	23	61	54.5
34	2	25	57	53.2
33	3	28	53	52.0
32	3	31	48	50.8
31	2	33	43	49.5
30	3	36	39	48.3
29	2	38	35	47.1
28	6	44	28	45.9
26	1	45	21	43.4
25	3	48	18	42.2
24	2	50	14	41.0
23	2	52	10	39.7
19	1	53	7	34.8
18	2	55	5	33.6
5	2	57	1	17.6

Mean = 31.33

Standard Deviation = 8.15

Variance = 66.48

Standard score has mean of 50 and standard deviation of 10.

Part II, 30 Items

Raw Score	Frequency	Cumulative Frequency	Percentile Rank	Standard Score
28	2	2	98	64.3
27	3	5	93	62.7
26	8	13	84	61.1
25	1	14	76	59.5
24	3	17	72	57.9
23	4	21	66	56.3
22	1	22	62	54.7
21	2	24	59	53.1
20	5	29	53	51.4
19	4	33	45	49.8
18	5	38	37	48.2
16	3	41	30	45.0
15	2	43	26	43.4
14	2	45	22	41.8
13	4	49	17	40.2
12	1	50	13	38.6
8	4	54	8	32.1
7	3	57	2	30.5

Mean = 19.07

Standard Deviation = 6.21

Variance = 38.67

Standard score has mean of 50 and standard deviation of 10.

Summary Data, Part I

Distribution of Item Difficulty Indices		Distribution of Discrimination Indices	
Number of Items	Percentage	Number of Items	Percentage
91 - 100	0	91 - 100	0
81 - 90	0	81 - 90	0
71 - 80	0	71 - 80	4
61 - 70	1	61 - 70	3
51 - 60	2	51 - 60	10
41 - 50	7	41 - 50	3
31 - 40	10	31 - 40	9
21 - 30	8	21 - 30	1
11 - 20	2	11 - 20	
00 - 10	0	00 - 10	
		Less than 00	0
Mean item difficulty		36	
Mean item discrimination		51	
Kuder Richardson Reliability #20		.8586	
Standard error of measurement		2.3345	

Summary Data, Part II

Distribution of Item Difficulty Indices			Distribution of Discrimination Indices		
	Number of Items	Percentage		Number of Items	Percentage
91 - 100		0	91 - 100		0
81 - 90		0	81 - 90		0
71 - 80		0	71 - 80	1	2
61 - 70		0	61 - 70	4	0
51 - 60	2	4	51 - 60	10	22
41 - 50	3	7	41 - 50	7	16
31 - 40	14	31	31 - 40	13	29
21 - 30	18	40	21 - 30	3	7
11 - 20	8	18	11 - 20	5	11
00 - 10		0	00 - 10	2	4
			Less than 00		0

Mean item difficulty 30
 Mean item discrimination 41
 Kuder Richardson Reliability #20 .8827
 Standard error of measurement 2.7903

Item Analysis, 45 Items, Part I

Percentages--Upper 27%, Middle 46%, Lower 27%

Item Key		1		2		3		4		5		Omit		Error		Diff	Disc	
1	3	0	4	20	7	0	20	93	89	47	0	7	7	0	0	0	21	46
2	2	7	0	7	87	85	40	0	11	33	0	4	13	7	0	0	26	47
3	2	0	0	13	93	93	60	7	4	7	0	0	0	0	0	0	16	33
4	4	7	4	7	0	4	7	0	7	13	0	4	0	0	0	0	18	20
5	1	100	85	60	0	7	13	0	7	0	0	7	0	0	0	0	18	40
6	2	0	11	0	93	63	47	0	4	20	0	0	13	0	0	0	33	46
7	3	7	41	20	13	11	27	80	44	40	0	0	7	0	4	0	47	40
8	2	7	4	7	87	74	53	0	4	13	0	4	0	0	0	7	28	34
9	1	93	63	60	0	4	7	0	0	7	0	4	7	0	0	0	30	33
10	2	0	7	20	93	78	40	0	11	13	0	0	7	0	4	0	28	53
11	1	100	89	60	0	0	13	0	4	0	0	0	7	0	0	13	16	40
12	2	7	11	20	93	59	47	0	15	7	0	4	7	0	7	13	35	46
13	3	0	0	27	0	4	13	100	81	47	0	4	13	0	0	0	23	53
14	1	93	67	40	0	15	27	0	7	20	0	4	13	0	4	0	33	53
15	3	0	0	0	0	4	20	100	85	67	0	7	7	0	0	0	16	33
16	2	7	7	33	87	70	40	0	15	7	7	0	13	0	7	0	33	47
17	2	7	7	7	73	63	33	0	11	13	13	19	47	7	0	0	42	40
18	3	0	11	20	7	19	20	80	63	40	0	4	13	13	0	7	39	40
19	3	0	11	13	7	22	47	93	56	33	0	7	7	0	0	0	40	60
20	3	0	4	20	0	0	13	100	96	33	0	0	33	0	0	0	19	67

Item Analysis, 30 Items, Part II

Percentages--Upper 27%, Middle 46%, Lower 27%

Item Key	1	2	3	4	5	Omit	Error	Diff	Disc
1	7	0	0	0	0	0	0	0	40
2	7	4	33	53	63	27	53	63	26
3	93	74	40	0	11	0	0	0	53
4	13	11	7	67	41	33	0	0	34
5	100	56	47	0	7	20	0	11	53
6	7	0	7	87	67	47	0	0	40
7	0	11	7	7	15	27	93	78	53
8	67	48	33	0	0	33	0	0	40
9	0	0	20	100	63	33	0	0	34
10	0	15	20	100	44	47	0	0	67
11	0	4	33	93	81	33	0	0	53
12	93	70	27	0	7	13	0	0	60
13	0	7	13	0	4	0	0	0	66
14	0	4	13	87	85	47	0	0	40
15	0	11	7	7	11	20	7	11	47
16	0	4	7	0	0	27	0	0	60
17	13	15	20	0	0	7	7	7	33
18	0	7	33	0	0	0	0	0	53
19	0	15	20	80	59	7	0	0	73
20	73	63	13	0	0	13	0	0	60

21	3	0	11	27	0	11	27	100	67	27	0	11	7	0	0	0	0	13	0	0	0	35	73
22	2	7	0	20	93	78	20	0	4	20	0	7	20	0	7	7	0	4	13	0	0	33	73
23	1	100	67	47	0	4	13	0	11	20	0	4	0	0	15	7	0	0	13	0	0	30	53
24	3	13	15	27	7	7	40	80	70	0	0	0	7	0	0	7	0	7	20	0	0	46	80
25	2	13	15	13	80	67	27	0	4	13	7	7	20	0	0	7	0	7	20	0	0	40	53
26	4	13	30	33	13	22	13	13	11	0	60	33	20	0	0	7	0	4	27	0	0	63	40
27	3	0	4	13	7	48	20	93	37	47	0	0	7	0	4	0	0	7	13	0	0	46	46
28	1	93	63	47	0	4	7	0	11	0	7	11	27	0	7	7	0	4	13	0	0	33	46
29	1	100	81	47	0	0	13	0	4	20	0	4	13	0	7	0	0	4	7	0	0	23	53
30	3	0	4	13	20	11	13	80	59	13	0	15	20	0	4	13	0	7	27	0	0	47	67

Item Number	Form 1A Part		Item Number	Form 1A Part	
	I	II		I	II
1	C	C	26	A	D
2	B	D	27	D	C
3	B	A	28	A	A
4	D	D	29	A	A
5	A	A	30	B	C
6	B	C	31	D	
7	C	B	32	A	
8	B	A	33	D	
9	A	C	34	C	
10	B	C	35	C	
11	A	B	36	B	
12	B	A	37	D	
13	C	D	38	B	
14	A	C	39	A	
15	C	B	40	D	
16	B	D	41	C	
17	B	D	42	D	
18	C	D	43	D	
19	C	B	44	C	
20	C	A	45	B	
21	A	C	46		
22	C	B	47		
23	B	A	48		
24	D	C	49		
25	D	B	50		

APPENDIX C

FACULTY QUESTIONNAIRE

Marking Instructions: Please circle the number of the response most appropriate.

Name _____ or Number _____

1. In which particular program are you participating:
 1. 13 College Program
 2. 5 College Program
 3. 8 College Program
 4. 3 Universities Program
 5. An extended program in the 13 College group
 6. An extended program in the 5 College group
 7. Other (please indicate) _____
2. If you are part of the 13 College Program, how long have you been with the program?
 1. new this summer
 2. 2nd year
 3. 3rd year
 4. 4th year
 5. 5th year
3. How long have you taught at the college in which you will be teaching this fall?

1. new to the college	5. 5th year
2. 2nd year	6. more than 5 years, but less than 10
3. 3rd year	7. more than 10 years
4. 4th year	8. graduate student
4. How many years have you taught at the College level (except as a graduate student assistant)?

1. None	5. 6 - 10 years
2. 1 year	6. 11 - 20 years
3. 2 years	7. more than 20 years
4. 3 - 5 years	

5. What is your subject area?

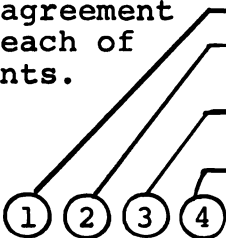
- | | |
|----------------------------------|------------------------|
| 1. English | 5. social sciences |
| 2. math | 6. physical science |
| 3. humanities | 7. biological sciences |
| 4. history | 8. philosophy |
| 9. Other (please indicate) _____ | |

6. At which college will you teach this fall (or attend, if you are a graduate student)?

- | | |
|-----------------------------------|--|
| 1. Alabama A & M University | 16. Lincoln University (Penn.) |
| 2. Alcorn A & M University | 17. Mary Holmes College |
| 3. Atlanta University | 18. Memphis State Univ. |
| 4. Bennett College | 19. Norfolk State Univ. |
| 5. Bethune-Cookman College | 20. North Carolina A & T University |
| 6. Bishop College | 21. St. Augustine College |
| 7. Clark College | 22. Southern University (Baton Rouge) |
| 8. Elizabeth City College | 23. Southern University (New Orleans) |
| 9. Fisk University | 24. Southern University (Shreveport) |
| 10. Florida A & M University | 25. Talladega College |
| 11. Grambling College | 26. Tennessee A & I Univ. |
| 12. Jackson State College | 27. Texas Southern Univ. |
| 13. Jarvis Christian College | 28. University of Maryland Eastern Shore |
| 14. Langston University | 29. Virginia Union Univ. |
| 15. LeMoyne-Owen College | 30. Voorhees College |
| 31. Other (please indicate) _____ | |

7. How was your participation in your program determined?
 1. volunteered or applied
 2. was assigned with prior consultation and agreement
 3. was assigned without prior consultation
 4. recruited from outside the college especially for the program
8. At the time you were assigned to teach in the program, were you satisfied with the assignment?
 1. I looked forward to teaching in the program
 2. I was reasonably satisfied with the assignment
 3. I had serious reservations
 4. I did not want to teach in the program
9. How do you presently feel about teaching in the program?
 1. I am very pleased to teach in the program
 2. I am reasonably satisfied to teach in the program
 3. I still have serious reservations about teaching in the program
 4. I would rather not teach in the program
10. What is your present rank?
 1. Instructor
 2. Assistant Professor
 3. Associate Professor
 4. Professor
 5. No ranks designated
 6. Graduate Student
 7. Other

11. What is the highest academic degree you now hold?
1. Bachelor's degree
 2. Master's degree
 3. Professional diploma or certificate
 4. Doctor's degree
 5. Other _____
12. Are you at present working actively toward any of the following?
1. Bachelor's degree
 2. Master's degree
 3. Professional diploma or certificate
 4. Doctor's degree
 5. Other _____
13. About how many contact hours are you required to spend with students per week?
- | | |
|---------------------|---------------------|
| 1. 3 | 5. approximately 15 |
| 2. approximately 6 | 6. 18 |
| 3. approximately 10 | 7. more than 18 |
| 4. approximately 12 | |
14. If you taught outside the program last term, how many students, on the average, were enrolled in each of your non-program courses?
- | | |
|---|----------------------------|
| 1. taught only in the program last term | 6. 100 - 149 |
| | 7. 150 - 250 |
| 2. under 25 | 8. more than 250 |
| 3. 25 - 49 | 9. did not teach last term |
| 4. 50 - 74 | |
| 5. 75 - 99 | |

15. Please indicate your agreement or disagreement with each of the following statements.
- 
1. Strongly agree
2. Agree with reservations
3. Disagree with reservations
4. Strongly disagree

Most undergraduates are mature enough to be given more responsibility for their own education 1 2 3 4

My department (program or department) has taken steps to increase undergraduate student participation in its decisions 1 2 3 4

Some genuinely interested students drop out because they do not want to "play the game" or "beat the system" 1 2 3 4

A person can be an effective teacher without personally being interested in his students . . 1 2 3 4

Most faculty at my institution are strongly interested in the problems of undergraduates . 1 2 3 4

Most colleges reward conformity and crush student creativity 1 2 3 4

More "remedial" undergraduates should be admitted to my institution even if it means relaxing normal academic standards of admission 1 2 3 4

Any institution with a substantial number of Black students should offer a program of Black Studies if they wish it 1 2 3 4

Any special academic program for Black students should be administered and controlled by Black people 1 2 3 4

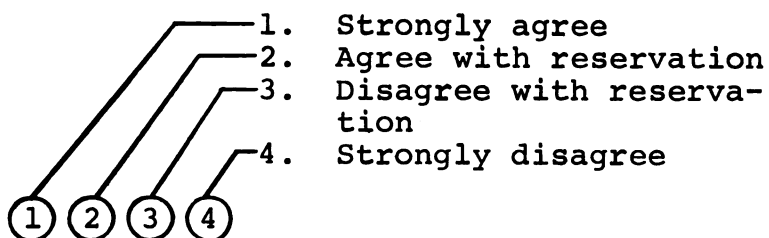
Undergraduate education in America would be improved if:

a) all courses were elective 1 2 3 4

b) grades were abolished 1 2 3 4

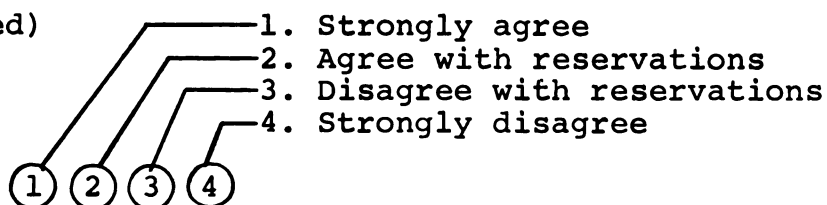
c) course work were more relevant to contemporary life and programs 1 2 3 4

15. (continued)



- d) more attention were paid to the
emotional growth of students 1 2 3 4
- e) students could obtain credit for a
year in community service at home
or abroad 1 2 3 4
- f) colleges and universities were
governed completely by their students
and faculty 1 2 3 4
- g) there were less emphasis on speciali-
zed training and more on broad
liberal education 1 2 3 4
- All students should be required to attend
class 1 2 3 4
- There is a body of information in my disci-
pline which should be systematically
presented 1 2 3 4
- All students should choose a major early
in their freshman year 1 2 3 4
- First year courses should cover the prere-
quisites for the departmental majors 1 2 3 4
- The majority of material in my course can
most effectively be covered by lecture 1 2 3 4
- Student discussion in class is most effective
when directed toward a teacher's previous
presentation 1 2 3 4
- A teacher should encourage a broad range
of student discussion 1 2 3 4
- Course materials should be tightly organized
and presented according to that organization . 1 2 3 4

15. (continued)



Many student learning opportunities are lost
by allowing too much student freedom
in the course 1 2 3 4

Students should play a role at least equal to
that of the teacher in determining the
content of the course 1 2 3 4

The content of a course should be re-
examined every year 1 2 3 4

Every effort should be made to cover pre-
determined course content 1 2 3 4

Greater effort should be made to provide
remedial work in the context of regular
classroom work 1 2 3 4

Teachers should direct student discussion . . . 1 2 3 4

The teacher should have a clear sense of
what is important in the course 1 2 3 4

The teacher should grade closely according
to a set of objective standards 1 2 3 4

Students are generally not prepared to work
at the level demanded by my course (courses) . 1 2 3 4

Based upon your previous experience, did you find:

a) students were very passive 1 2 3 4

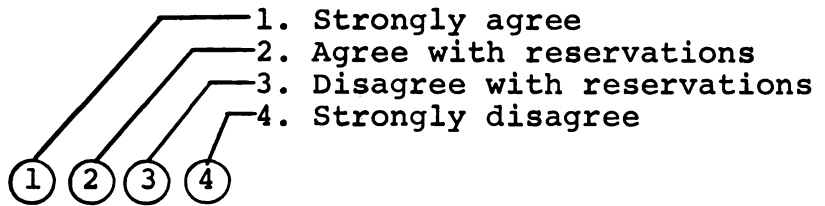
b) students wouldn't do the required
reading 1 2 3 4

c) student homework assignments were
rarely completed on time 1 2 3 4

d) students were unwilling to speak up
in class 1 2 3 4

e) increased student participation in
class would result in less student
learning 1 2 3 4

15. (continued)



f) students did not appear interested in
my course content 1 2 3 4

g) classroom discussion rarely developed
facts or interpretations that sur-
prised me 1 2 3 4

h) students rarely engaged in additional
outside reading 1 2 3 4

Colleges should raise their admission
standards 1 2 3 4

Written examinations are the most effective
means of assessing individual student
learning 1 2 3 4

16. Do you feel that the administration of your institu-
tion is:

1. very autocratic
2. somewhat autocratic
3. somewhat democratic
4. very democratic

17. Do you feel that the administration of the program or
department in which you taught last year is:

1. very autocratic
2. somewhat autocratic
3. somewhat democratic
4. very democratic

18. How much opportunity do you feel you have to influence the policies of:
1. A great deal
2. Quite a bit
3. Some

1. None
2. Does not apply
3. Does not apply
4. Does not apply
5. Does not apply

```
a) your program . . . . . 1 2 3 4 5
```

b) your department 1 2 3 4 5

c) your institution 1 2 3 4 5

19. What do you think of the emergence of radical student activism in recent years?

1. unreservedly approve
2. approve with reservations
3. disapprove with reservations
4. unreservedly disapprove

20. Has your campus experienced any student protests or demonstrations during the past academic year?

1. yes 2. no

21. What role do you believe undergraduates should play in decisions on the following:

① you believe
 ② ns should
 ③ ions on
 ④ :
 ⑤

1. Control
2. Voting power on committees
3. Formal consultation
4. Informal consultation
5. Little or no role

Faculty appointment and promotion	1	2	3	4	5
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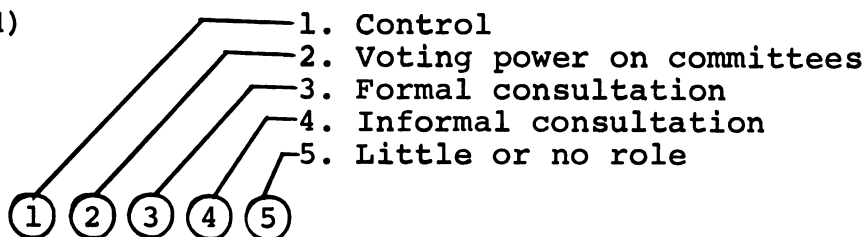
Assignment of faculty to courses	1	2	3	4	5
--	---	---	---	---	---

Undergraduate admissions policy 1 2 3 4 5

Granting of tenure to faculty members . . .	1	2	3	4	5
---	---	---	---	---	---

Provision and content of courses	1	2	3	4	5
--	---	---	---	---	---

21. (continued)



Student discipline 1 2 3 4 5

Bachelor's degree requirements 1 2 3 4 5

Below are a number of questions about the way teachers sometimes act in their classrooms. Each question is followed by a continuum moving from "Almost Never" to "Almost Always." Please check (✓) in the appropriate space on each continuum the degree to which the corresponding question represents how you act in your classroom.

Do you organize and interpret subject matter for the students?

Almost
Never _____ I _____ I _____ I _____ I _____ I _____ Almost
Sometime Always

Do you ask students to suggest additional or alternative answers?

Almost
Never _____ I _____ I _____ I _____ I _____ I _____ Almost
Sometime Always

Do you have the students decide when questions have been answered satisfactorily?

Almost
Never _____ I _____ I _____ I _____ I _____ I _____ Almost
Sometime Always

Do you assign different tasks for different students (or groups) at one time?

Almost
Never _____ I _____ I _____ I _____ I _____ I _____ Almost
Sometime Always

Do you immediately reinforce students' answers as "right" or "wrong"?

Almost
Never _____ I _____ I _____ I _____ I _____ I _____ Almost
Sometime Always

Do you encourage self-discipline on the part of the students?

Almost							Almost
Never	_____	I_____	I_____	I_____	I_____	I_____	Always
			Sometime				

Do you make yourself the center of class attention?

Almost							Almost
Never	_____	I_____	I_____	I_____	I_____	I_____	Always
			Sometime				

Do you feel that you must impose your own disciplinary control over the class?

Almost							Almost
Never	_____	I_____	I_____	I_____	I_____	I_____	Always
			Sometime				

Do you have all students working on the same tasks at the same time?

Almost							Almost
Never	_____	I_____	I_____	I_____	I_____	I_____	Always
			Sometime				

Do you accept one answer only as being correct?

Almost							Almost
Never	_____	I_____	I_____	I_____	I_____	I_____	Always
			Sometime				

Do you have the students make their own organization and interpretation of subject matter?

Almost							Almost
Never	_____	I_____	I_____	I_____	I_____	I_____	Always
			Sometime				

Do you tend to ask questions which demand student interpretation?

Almost							Almost
Never	_____	I_____	I_____	I_____	I_____	I_____	Always
			Sometime				

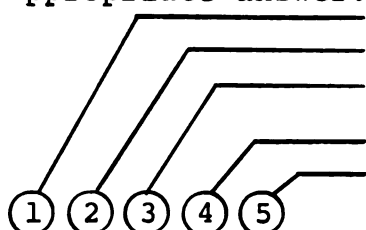
Do you make students the center of class attention?

Almost							Almost
Never	_____	I_____	I_____	I_____	I_____	I_____	Always
			Sometime				

Do you tend to ask mostly factual questions?

Almost
Never _____ I _____ I _____ I _____ I _____ I _____ Always
Sometime

Please circle the appropriate answer.

- 
1. I strongly agree
 2. I agree a little
 3. I neither agree
nor disagree
 4. I disagree a little
 5. I strongly disagree

I feel that I should teach as I was taught . 1 2 3 4 5

I am optimistic about new methods of
teaching 1 2 3 4 5

I feel hostile to those who suggest that I
change the way I teach 1 2 3 4 5

I would feel secure in changing my methods
of teaching 1 2 3 4 5

I hesitate to make changes in the way I
teach because I fear failure 1 2 3 4 5

I feel that my educational training is
adequate for the kind of teaching I would
like to do 1 2 3 4 5

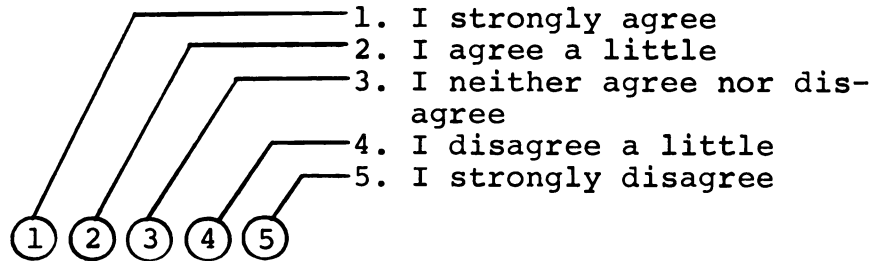
I prefer the didactic (lecturing) method
of teaching as compared with an inductive
method 1 2 3 4 5

I am accepted professionally by other
teachers 1 2 3 4 5

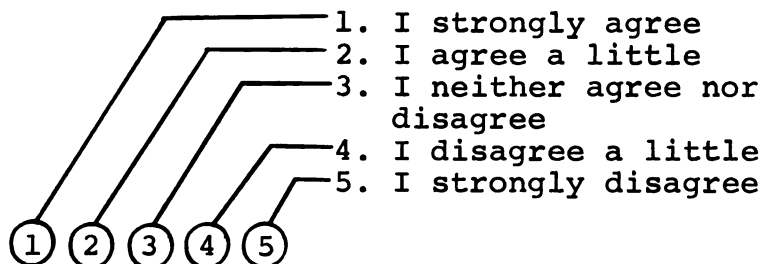
I do not have enough experiences to do the
kind of teaching I would like to do 1 2 3 4 5

My personality is not suited for all the
changes the administration expects
of teachers 1 2 3 4 5

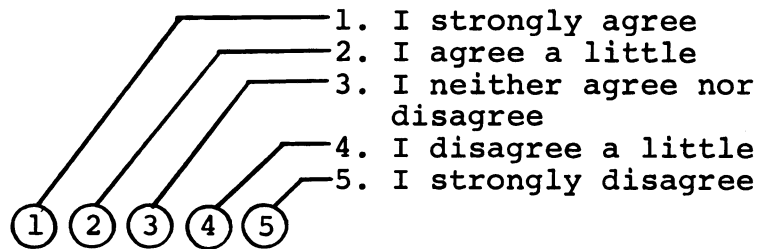
I feel I should teach the ideologies and
behaviors of the majority race in this
country 1 2 3 4 5



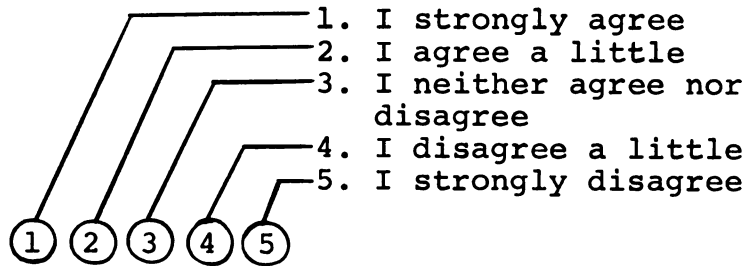
I feel it's difficult to be at ease teaching when another teacher is in the classroom with me	1	2	3	4	5
When I try something new I feel frustrated	1	2	3	4	5
I am accepted socially by other teachers .	1	2	3	4	5
I seem to lack the incentive I need to do a better job of teaching	1	2	3	4	5
I feel I should teach the ideologies and behaviors of the minority race in this country	1	2	3	4	5
I feel that I would receive strong support from my superiors if I attempted any significant teaching changes	1	2	3	4	5
The president is concerned with the real instructional problems in the institution .	1	2	3	4	5
Other teachers are helpful to me as I work with new ideas	1	2	3	4	5
I have no desire to improve my teaching methods because the department chairman if fault finding	1	2	3	4	5
Other teachers are critical of one's new ideas	1	2	3	4	5
The teachers who plan and make the cur- riculum have a lot of reckless ideas . . .	1	2	3	4	5
The older teachers with tenure always seem to get their ways	1	2	3	4	5
There is so much continual petty bickering among our teaching staff that one does not care to do anything	1	2	3	4	5



When I try out new ideas, I never talk to the department chairman about them, because he seems to care less	1	2	3	4	5
There are too few administrators who believe in the adage, "Let well enough alone"	1	2	3	4	5
Teachers should be expected to try out new teaching methods only when the students' abilities are known	1	2	3	4	5
Students should have some influence in the involvement of curriculum changes	1	2	3	4	5
I do not feel that I can try out new teaching methods, because of the large number classes I have to teach	1	2	3	4	5
You cannot expect a teacher to try out new ideas when most of the students are behind in their subject-matter	1	2	3	4	5
One should not waste time trying out new ideas when most of the students are adverse to learning	1	2	3	4	5
The institution's policy toward student-teacher ratio is not realistic	1	2	3	4	5
With all the time that teaching consumes, teachers should not be expected to be able to keep up with the new trends	1	2	3	4	5
Teachers should not be expected to participate in making curriculum changes when they have to make too many subject matter preparations	1	2	3	4	5
Faculty meetings in which curriculum improvement is discussed are of value to me .	1	2	3	4	5



No one bothers to inform teachers in their department of new teaching materials and methodologies	1	2	3	4	5
The institution's policy toward student-teacher relation is not realistic	1	2	3	4	5
The institution's administrators should discourage membership in groups like the AAUP	1	2	3	4	5
The outstanding teacher does not have much incentive when his salary is fixed to a rigid schedule	1	2	3	4	5
Teachers should avoid active participation in local political affairs	1	2	3	4	5
I cannot make any changes in my teaching until the institution provides sufficient supplies and materials	1	2	3	4	5
The institution has enough money if it were spent wisely	1	2	3	4	5
I have all the equipment I need to teach effectively	1	2	3	4	5
The equipment I need never seems to be in operational order	1	2	3	4	5
There is a lack of classroom space	1	2	3	4	5
I would use more films if they were available when I want them	1	2	3	4	5
My institution seems to have a warm inviting atmosphere	1	2	3	4	5
My institution seems to be designed for the type of teaching I prefer to do	1	2	3	4	5



If this is your first TCCP Summer Conference participation, please omit this part of the project.

My participation in the TCCP Summer conference(s) have greatly increased my knowledge of new strategies and approaches . . . 1 2 3 4 5

The TCCP have made available persons very helpful in developing curriculum materials 1 2 3 4 5

The TCCP is realistic about teaching problems at my college 1 2 3 4 5

The TCCP provides an opportunity of freedom in developing curriculum materials 1 2 3 4 5

The TCCP provides adequate opportunities for communication between groups within my own discipline 1 2 3 4 5

The TCCP provides adequate opportunities for communication between individuals within my own discipline 1 2 3 4 5

The TCCP provides a well balance of freedom between individual teachers and a structure for effective group work 1 2 3 4 5

The TCCP provides adequate communication between individuals across the entire conference 1 2 3 4 5

The TCCP provides an adequate balance between the discussion of teaching strategies and content materials 1 2 3 4 5

The TCCP provides consultants who are helpful in my teaching discipline 1 2 3 4 5

Since my participation in the TCCP summer conference(s) I have been able to solve some of my instructional problems 1 2 3 4 5

My perceptions of student's learning have changed since my participation in the TCCP summer conference(s) 1 2 3 4 5

I am willing to try new teaching strategies and materials since my participation in TCCP summer conference(s) 1 2 3 4 5

The TCCP summer conference(s) have increased my desire to learn more about teaching 1 2 3 4 5

22. How many quarter hours of formal training have you had in science (if semester hours, multiply by 1-1/2, for example, 30 semester hours are equivalent to 45 quarter hours).

Quarter hours

1. 9 or less
2. 18 - 24
3. 25 - 32
4. 33 - 45
5. 46 - 60
6. 61 - 90
7. 91 or more

23. What is the date of your birth?

- | | |
|-------------------|------------------|
| 1. 1910 or before | 6. 1931-1935 |
| 2. 1911-1915 | 7. 1936-1940 |
| 3. 1916-1920 | 8. 1941-1945 |
| 4. 1921-1925 | 9. 1946 or later |
| 5. 1926-1930 | |

24. Your sex:

1. Male
2. Female

25. Your race:

1. White/Caucasian
2. Black/Negro/Afro-American
3. Indian
4. Oriental
5. Other _____

26. Your marital status:

1. Single
2. Married
3. Other _____

APPENDIX D

FACULTY QUESTIONNAIRE INDIVIDUAL PRE-SCORES

Teacher Number	Attitude toward Students	Attitude toward Teaching	Attitude toward College	Attitude toward Curriculum Innovation	Attitude toward Adminis- trators	Total Score
1	102	138	41	44	33	358
2	66	100	32	26	21	245
3	101	133	30	49	40	353
4	106	126	42	42	48	364
5	106	124	32	44	28	333
6	106	121	38	44	28	337
7	99	103	29	32	32	295
8	81	113	30	38	33	295
9	97	100	43	46	43	329
10	96	111	22	40	26	295
11	95	113	27	36	17	288
12	90	121	38	28	27	304
13	129	139	38	51	32	389
14	71	108	33	27	36	275
15	97	110	37	38	28	310
16	80	122	31	38	23	294
17	92	123	28	39	23	305
18	97	109	47	37	28	318
19	86	114	28	28	19	275
20	117	104	32	32	26	311

21	94	92	35	32	25	278
22	100	110	23	29	24	286
23	83	103	25	33	22	266
24	89	111	27	31	34	292
25	113	131	42	42	38	356
26	107	124	40	36	29	336
27	113	123	48	41	44	369
28	85	110	40	39	26	300
29	94	115	40	38	28	315
30	90	105	44	35	31	305
31	90	118	39	31	39	317
32	104	128	36	39	31	338
33	81	110	29	32	29	281
34	83	112	45	31	30	301
35	81	106	37	34	31	321
36	95	118	29	33	32	307
37	96	125	40	37	25	323
38	86	115	37	35	30	303
39	106	123	23	31	29	312
40	83	115	41	38	42	319
41	115	107	44	42	35	343
42	101	131	47	37	22	338
43	96	125	42	31	37	331
44	77	111	54	32	35	309
45	90	106	37	34	23	290

Teacher Number	Attitude toward Students	Attitude toward Teaching	Attitude toward College	Attitude toward Curriculum Innovation	Attitude toward Adminis- trators	Total Score
46	95	108	33	35	23	294
47	115	109	41	47	23	335
48	87	120	33	35	15	290
49	100	105	47	33	32	317
50	72	104	43	24	29	272
51	96	127	44	37	39	343
52	86	113	44	39	25	307
53	95	95	45	28	33	296
54	92	117	40	30	32	311
55	103	129	49	39	37	357
56	79	106	40	36	36	297
57	101	131	44	46	41	363

APPENDIX E

FACULTY QUESTIONNAIRE INDIVIDUAL POST SCORES

Teacher Number	Attitude toward Students	Attitude toward Teaching	Attitude toward College	Attitude toward Curriculum Innovation	Attitude toward Adminis- trators	Total Score
1	118	132	39	50	31	370
2	107	122	32	45	26	332
3	107	117	29	33	21	307
4	92	141	38	40	26	337
5	94	136	35	45	28	338
6	98	145	42	43	32	360
7	73	129	25	27	16	270
8	98	124	35	44	30	331
9	100	131	42	44	28	345
10	102	117	48	41	36	344
11	115	128	28	44	21	336
12	109	135	35	40	29	348
13	108	121	27	38	22	316
14	107	114	25	31	24	301
15	97	130	40	40	28	335
16	112	111	31	41	25	320
17	87	113	41	30	29	300
18	91	121	30	27	25	294
19	88	123	24	30	26	291
20	88	120	26	32	29	295

21	97	109	42	30	31	309
22	97	121	39	31	36	324
23	99	128	44	44	33	348
24	101	112	36	24	22	295
25	114	135	35	38	38	360
26	110	125	34	38	28	335
27	95	132	42	28	31	328
28	98	112	40	36	32	318
29	105	130	41	37	33	346
30	94	131	46	35	32	338
31	97	122	41	46	29	335
32	112	128	43	35	35	353
33	101	122	36	34	27	320
34	95	140	40	37	33	345
35	106	119	39	37	25	326
36	91	134	44	42	35	346
37	100	123	45	38	22	328
38	91	127	37	28	40	323
39	118	119	37	48	41	363
40	116	130	42	44	33	365
41	117	107	22	38	20	304
42	102	110	25	28	20	285
43	104	121	40	29	34	328
44	91	141	40	40	32	344
45	91	136	35	43	31	336

Teacher Number	Attitude toward Students	Attitude toward Teaching	Attitude toward College	Attitude toward Curriculum Innovation	Attitude toward Adminis- trators	Total Score
46	110	110	36	37	30	323
47	105	131	40	50	34	360
48	95	115	45	29	28	312
49	101	123	43	36	40	343
50	90	144	37	39	31	341
51	105	112	44	33	27	321
52	94	125	41	43	33	336
53	88	129	41	40	36	334
54	106	125	43	43	30	347
55	103	121	39	33	35	331

APPENDIX F

FACULTY ASSESSMENT QUESTIONNAIRE

<u>Marking Instructions:</u> Please circle the <u>number</u> of the response most appropriate.

1. In which particular program are you participating:
 1. 13 College Program
 2. 5 College Program
 3. 8 College Program
 4. 3 Universities Program
 5. An extended program in the 13 College group
 6. An extended program in the 5 College group
 7. Other (Please indicate) _____
2. If you are part of the 13 College Program, how long have you been with the program?
 1. new this summer
 2. 2nd year
 3. 3rd year
 4. 4th year
 5. 5th year
3. How long have you taught at the college in which you will be teaching this fall?
 1. new to the college
 2. 2nd year
 3. 3rd year
 4. 4th year
 5. 5th year
 6. more than 5 years, but less than 10
 7. more than 10 years
 8. graduate student
4. How many years have you taught at the College level (except as a graduate student assistant)?
 1. None
 2. 1 year
 3. 2 years
 4. 3-5 years
 5. 6-10 years
 6. 11-20 years
 7. more than 20 years

5. What is your curriculum area?

- | | |
|--------------------|------------------------|
| 1. English | 6. physical science |
| 2. math | 7. biological sciences |
| 3. humanities | 8. philosophy |
| 4. history | 9. counselors |
| 5. social sciences | |

6. At which college will you teach this fall (or attend, if you are a graduate student)?

- | | |
|-----------------------------|---------------------------------------|
| 1. Alabama A&M Univ. | 18. Mary Holmes College |
| 2. Alcorn A&M Univ. | 19. Memphis State Univ. |
| 3. Atlanta University | 20. Norfolk State Univ. |
| 4. Bennett College | 21. North Carolina A&T University |
| 5. Bethune-Cookman College | 22. St. Augustine College |
| 6. Bishop College | 23. Southern University (Baton Rouge) |
| 7. Clark College | 24. Southern University (New Orleans) |
| 8. Elizabeth City College | 25. Southern University (Shreveport) |
| 9. Fayetteville State Univ. | 26. Talladega College |
| 10. Fisk University | 27. Tennessee A&I Univ. |
| 11. Florida A&M Univ. | 28. Texas Southern Univ. |
| 12. Grambling College | 29. University of Maryland |
| 13. Jackson State College | 30. Eastern Shore |
| 14. Jarvis Christian | 31. Voorhees College |
| 15. Langston Univ. | 32. Other (Please indicate) |
| 16. LeMoyne-Owen College | <hr/> |
| 17. Lincoln Univ. (Penn.) | |

7. How was your participation in your program determined?
 1. volunteered or applied
 2. was assigned with prior consultation and agreement
 3. was assigned without prior consultation
 4. recruited from outside the college especially for the program
8. At the time you were assigned to teach in the program, were you satisfied with the assignment?
 1. I looked forward to teaching in the program
 2. I was reasonably satisfied with the assignment
 3. I had serious reservations
 4. I did not want to teach in the program
9. How do you presently feel about teaching in the program?
 1. I am very pleased to teach in the program
 2. I am reasonably satisfied to teach in the program
 3. I still have serious reservations about teaching in the program
 4. I would rather not teach in the program
10. What is your present rank?
 1. Instructor
 2. Assistant Professor
 3. Associate Professor
 4. Professor
 5. No ranks designated
 6. Graduate Student
 7. Other

Based upon your experience this summer, please indicate your agreement or disagreement with the following statements:

-
1. Strongly agree
 2. Agree with reservations
 3. Disagree with reservations
 4. Strongly disagree

The summer conference was effective in increasing my knowledge of new strategies or approaches to teaching 1 2 3 4

I was exposed to a usable body of curriculum materials 1 2 3 4

Conference activities realistically focused on the teaching problems at my college 1 2 3 4

Usable classroom materials for the school year were developed 1 2 3 4

I had the opportunity to enlarge on the stated objectives in my curriculum area 1 2 3 4

There was an atmosphere of freedom to develop whatever materials I wanted to develop 1 2 3 4

I had the opportunity to become personally involved in determining the goals of my curriculum area 1 2 3 4

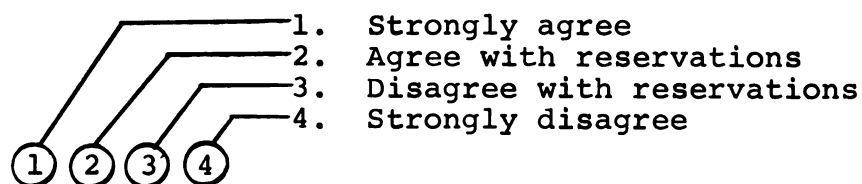
All of the materials or supplies I needed were readily available 1 2 3 4

When the materials or supplies I needed were not on hand, I was easily able to get them 1 2 3 4

The conference effectively developed materials to fill gaps discovered in previous materials 1 2 3 4

Communication among participants in my discipline was good 1 2 3 4

Communication among participants across different disciplines was good 1 2 3 4



Communication among the program staff from
my college was good 1 2 3 4

The conference provided an effective balance
between freedom for individual teachers and
a structure for group work 1 2 3 4

The conference accommodated itself to
teachers with different backgrounds 1 2 3 4

The conference accommodated itself to
teachers with different numbers of years
of experience in the program 1 2 3 4

I found the ISE program associates
responsive to my needs 1 2 3 4

I found the ISE secretarial services
responsive to my needs 1 2 3 4

Teaching strategy in relation to specific
content or materials was always discussed
adequately in my curriculum area 1 2 3 4

The short-term consultants (as opposed to
the ISE staff) provided in my curriculum
area were very helpful 1 2 3 4

I am looking forward to using the classroom
materials developed in my area 1 2 3 4

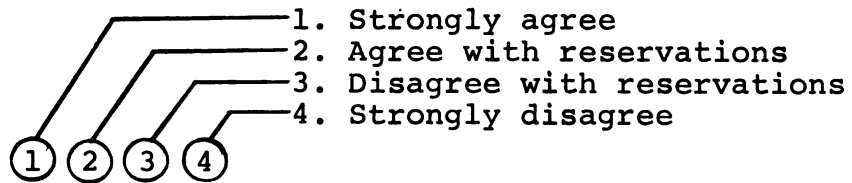
In my curriculum area, in preparation for
teaching this fall:

a) the choice of content is good 1 2 3 4

b) the choice of content represents a
break with the usual selection 1 2 3 4

c) the choice of methods is good 1 2 3 4

d) the choice of methods represents a
break with usual teaching practices 1 2 3 4



I was allowed to contribute to the selection
of content and methods 1 2 3 4

All in all, the goals of the conference
were specified with sufficient clarity 1 2 3 4

I was able during the summer program to help
develop further the specification of goals . . 1 2 3 4

All in all, the roles of conference partici-
pants were defined with sufficient clarity . . 1 2 3 4

I was able during the summer program to help
define participant roles further 1 2 3 4

The conference was personally productive . . . 1 2 3 4

The conference was personally enjoyable 1 2 3 4

I have sufficient understanding of the
materials to start teaching them with
confidence this fall 1 2 3 4

I have sufficient understanding of the
teaching strategies to start using them
with confidence this fall 1 2 3 4

The conference was different from my
previous educational experiences 1 2 3 4

Please indicate approximate emphasis by a check mark (✓)
on the continuums below.

In your curriculum area, the relative emphasis was too
heavily on content? on method? was just right?

I _____ I _____ I _____ I _____ I _____ I _____ I _____ I
Content Just Right Method

How much of your course this coming school year do you
expect to devote to materials and ideas developed during
the present and previous summer conferences?

I _____ I _____ I _____ I _____ I _____ I _____ I _____ I
None Half All

On the continuums below, indicate the relative position by a check mark (✓) of the ISE program staff in your curriculum area.

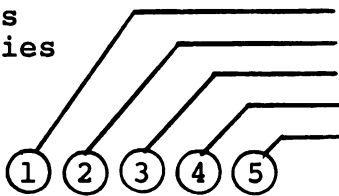
I-----I-----I-----I-----I-----I-----I-----I
Rigid Flexible

I-----I-----I-----I-----I-----I-----I-----I
Democratic Authoritarian

I-----I-----I-----I-----I-----I-----I-----I
Knowledgeable Not so Knowledgeable

I-----I-----I-----I-----I-----I-----I-----I
Not So Helpful Helpful

Please indicate your feelings about the conference facilities and arrangements by circling the appropriate response to the areas indicated below:

- 
1. Excellent
 2. Good
 3. Adequate
 4. Poor
 5. Terrible

The living accommodations were 1 2 3 4 5

The food was 1 2 3 4 5

The food service (including hours) was . . 1 2 3 4 5

The recreational facilities were 1 2 3 4 5

Organized recreational activities were . . 1 2 3 4 5

The mail service was 1 2 3 4 5

The telephone and message service was . . . 1 2 3 4 5

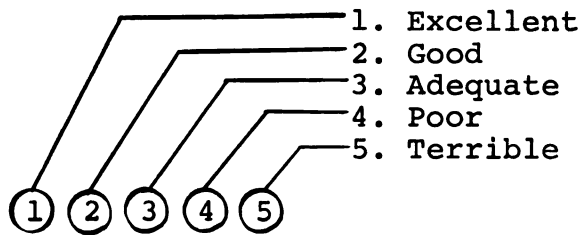
The facilities for group meetings were . . 1 2 3 4 5

The facilities for individual study were . 1 2 3 4 5

The facilities for laboratory or studio work were 1 2 3 4 5

For purposes of the conference, the college library was 1 2 3 4 5

Financial arrangements with your college concerning the conference were 1 2 3 4 5



Check cashing arrangements were 1 2 3 4 5

Security arrangements were 1 2 3 4 5

Opportunities for social interaction
were 1 2 3 4 5

IN THE SPACE BELOW, PLEASE FEEL FREE TO ADD CLARIFICATION
TO THE ABOVE RESPONSES OR TO ADD ANY OTHER COMMENTS ABOUT
ARRANGEMENTS OR FACILITIES (use the back of the page if
necessary).

What did you expect out of this conference with respect to:

a) curriculum materials?

b) teaching strategies?

c) amount of freedom to "do your own thing"?

d) other?

To what degree were these expectations fulfilled?

Please circle the number corresponding to the appropriate response.

What is the data of your birth?

- | | |
|-------------------|------------------|
| 1. 1910 or before | 6. 1931 - 1935 |
| 2. 1911 - 1920 | 7. 1936 - 1940 |
| 3. 1916 - 1920 | 8. 1941 - 1945 |
| 4. 1921 - 1925 | 9. 1946 or later |
| 5. 1926 - 1930 | |

Your sex:

1. Male
2. Female

Your race:

- | | |
|------------------------------|-------------|
| 1. White/Caucasian | 4. Oriental |
| 2. Black/Negro/Afro-American | 5. Other |
| 3. Indian | |

Your marital status:

1. Single
2. Married
3. Other

APPENDIX G

**FACULTY ASSESSMENT QUESTIONNAIRE
INDIVIDUAL SCORES**

Teacher Number	Summer Conference Assessment Scores	Summer Conference Assessment Scores
	Part I	Part II
1	118	58
2	81	42
3	74	43
4	41	25
5	87	57
6	70	48
7	74	38
8	46	40
9	81	41
10	52	36
11	59	52
12	98	38
13	105	30
14	102	30
15	112	34
16	104	31
17	92	41
18	97	37
19	102	37
20	96	36
21	113	42
22	104	35
23	95	29
24*	71	47
25	130	52
26	102	61
27	101	49
28	87	63
29	73	42
30	89	57

Teacher Number	Summer Conference Assessment Scores	Summer Conference Assessment Scores
	Part I	Part II
31	80	39
32	66	44
33	69	41
34	72	44
35	58	36
36	61	24
37	86	27
38	83	45
39	97	47
40	100	42
41	119	61
42	81	51
43	108	62
44	81	33
45	101	48
46	69	35
47	73	53
48	98	51
49	75	30
50	66	15
51	94	39
52	109	40
53	96	37
54	105	49
55	100	49

*Indicates 1 through 23 are physical science teachers and 24 through 55 are biology teachers.

APPENDIX H

FACULTY ASSESSMENT QUESTIONNAIRE: HOYTE
RELIABILITY AND STANDARD ERRORS
(Scale 1 and 2)

Source	DF	Sum of Squares	Mean Square	F	Reliability Estimate	Standard Error
S c a l e 1						
IND	56	2.3133807492 + 002	4.1310370521 + 000	3.5547902539 + 000	0.7187	6.4681
ITEMS	36	4.9552204848 + 002	1.3764501346 + 001	1.1844462932 + 001		
ERROR	2016	2.3428022759 + 003	1.1621043035 + 000			
TOTAL	2108	3.0696623443 + 003				
S c a l e 2						
IND	56	2.5078947401 + 002	4.4783834644 + 000	2.7451805933 + 000	0.6357	7.9764
ITEMS	39	2.1736052637 + 003	5.5733468301 + 001	3.4163763955 + 001		
ERROR	2184	3.5628947363 + 003	1.6313620587 + 000			
TOTAL	2279	5.987289470 + 003				

APPENDIX I

RAW REGRESSION COEFFICIENTS

	Attitude toward Students	Attitude toward Teaching	Attitude toward College	Attitude toward Curriculum	Attitude toward Adminis- trators
Attitude toward summer confer- ence-1	0.037086	-0.118412	-0.135667	-0.028375	0.061058
Attitude toward summer confer- ence-2	0.251605	0.297934	-0.018637	0.219960	0.072378
STEP test-1	0.827187	0.219929	0.076811	0.154110	0.196761
STEP test-2	-0.716545	0.101465	0.085900	-0.217068	-0.289870
Classload	2.922431	-0.047719	0.189108	1.273528	0.855427
Science training	0.952571	-2.251930	-0.200380	-1.249323	-0.998561
Sex	-0.338768	3.065499	0.169905	0.677600	-0.357069
Teaching experience	-0.191990	-0.655998	0.058374	-0.299084	-0.533692
Subject area	4.085671	-5.747852	-3.767287	-1.829537	-0.454021
Age	-2.391241	0.462942	0.450184	-0.259432	-0.150068

APPENDIX J

STANDARD ERRORS OF RAW REGRESSION COEFFICIENTS

	Attitude toward Students	Attitude toward Teaching	Attitude toward College	Attitude toward Curriculum	Attitude toward Adminis- trators
Attitude toward summer confer- ence-1	0.104911	0.095540	0.068196	0.057737	0.072577
Attitude toward summer confer- ence-2	0.223863	0.203867	0.145518	0.123202	0.154868
STEP test-1	0.420681	0.383104	0.273456	0.231519	0.291026
STEP test-2	0.520068	0.473613	0.338061	0.286216	0.359782
Classload	1.064278	0.969212	0.691815	0.585719	0.736265
Science Training	0.916531	0.834663	0.595775	0.504408	0.634054
Sex	3.890225	3.542734	2.528771	2.140963	2.691249
Teaching experience	1.614262	1.470069	1.049322	0.888400	1.116743
Subject area	4.502849	4.100636	2.926997	2.478118	3.115061
Age	1.348127	1.227707	0.876326	0.741934	0.932631

APPENDIX K

CORRELATION MATRIX

	STEP 1	STEP 2	SUMATT	SUMMEC
STEP 1	1.000000			
STEP 2	0.733651*	1.000000		
SUMATT	-0.175093	-0.153506	1.000000	
SUMMEC	-0.132418	0.003850	0.316416*	1.000000
ATTSTD	0.112001	0.000378	0.078761	0.119103
ATTTCH	0.253260	0.271140*	-0.148216	0.039907
ATTCOL	0.145325	0.112700	-0.324956*	-0.173815
ATTCUR	0.081456	0.071530	0.007396	0.119929
ATTADM	0.051497	-0.007198	0.144787	0.023181
SUBJAR	0.156523	0.279747*	0.010647	0.241099
SEX	-0.055083	0.159483	-0.017366	-0.045684
TCHEXP	0.113715	0.018841	0.039417	0.145587
CLLOAD	-0.087199	0.009038	0.016536	-0.081312
SCITRN	-0.334003	-0.343462*	0.033379	0.144889

*Correlation significant at + .05.

	ATTSTD	ATTCH	ATTCOL	ATTCUR	ATTADM
ATTSTD	1.000000				
ATTCH	-0.025690	1.000000			
ATTCOL	0.155032	0.089121	1.000000		
ATTCUR	0.482183*	0.462445*	0.307042*	1.000000	
ATTADM	0.165102	0.179281	0.444691*	0.440925*	1.000000
SUBJAR	0.107832	0.013679	-0.150249	0.064452	0.057665
SEX	-0.083352	0.060140	0.002589	-0.039055	-0.085491
TCHEXP	0.148202	-0.046991	-0.019949	-0.012835	-0.077565
CLLOAD	0.327445*	-0.138187	0.007570	0.164807	0.096852
SCITRN	0.131061	-0.396230*	-0.032484	-0.280229	-0.214326

*Correlation significant at + .05.

	SUBJAR	SEX	TCHEXP	CLLOAD	SCITRN
SUBJAR	1.000000				
SEX	0.172131	1.000000			
TCHEXP	-0.185025	0.029075	1.000000		
CLLOAD	0.150751	0.076191	-0.151653	1.000000	
SCITRN	-0.207156	0.072320	0.040011	0.235590	1.000000

APPENDIX L

STANDARDIZED REGRESSION COEFFICIENTS

	ATTSTD	ATTCH	ATTCOL	ATTCUR	ATTADM
SUMATT	0.048857	-0.173203	-0.297389	-0.071431	0.128552
SUMMEC	0.178114	0.234174	-0.021953	0.297545	0.081885
STEP 1	0.425020	0.125467	0.065690	0.151310	0.161572
STEP 2	-0.296646	0.046639	0.059173	-0.171721	-0.191787
CLLOAD	0.385523	-0.006989	0.041510	0.321031	0.180348
SCITRN	0.165070	-0.433277	-0.057777	-0.413692	-0.276545
SEX	-0.012623	0.126819	0.010534	0.049245	-0.021263
TCHEXP	-0.020827	-0.079011	0.010537	-0.061997	-0.092525
SUBJAR	0.138749	-0.216727	-0.212877	-0.118724	-0.024641
AGE	-0.322861	0.069400	0.101138	-0.066934	-0.032382

APPENDIX M

LETTERS OF CORRESPONDENCE

INSTITUTE FOR SERVICES TO EDUCATION
Incorporated
2001 S Street, N.W.
Washington, D.C. 20009

January 27, 1972

Mr. Willie M. Clark
1308E University Village
East Lansing, Michigan

Dear Mr. Clark:

I received your letter last week and was very glad to hear from you. Apparently you are getting along very well if you are ready to consider thesis topics. I am sure that there are a number of interesting things to investigate further in the ISE related programs. However, I do not know where your research interest lie. If you could tell me in what aspects of either teaching or of educational research you are most interested, we would be better able to identify a problem which might be of interest to you.

I hope that you and your family are enjoying the year at East Lansing and I will look forward to hearing from you soon.

Sincerely,

Charles M. Goolsby
Senior Program Associate

CG/gb

1308E University Village
Michigan State University
East Lansing, Michigan
May 14, 1971

Dr. Frederick S. Humphries
Director Curriculum Resources Group
Institute for Service to Education

Dear Dr. Humphries:

I am at the stage of my doctoral program of selecting and implementing a research proposal. Since having experienced some of the problems of implementing the 13-Colleges Curriculum Program as a teaching participant, I have tentatively selected a researchable problem relevant to the philosophy and practices of this innovated project.

In a personal conversation some weeks ago with Dr. Parameter, while he was here at Michigan State, he impressed me of being very optimistic of the possibility of me securing your approval and some financial support in carrying out this task.

Also it's been rumored that there will be eight additional colleges to the program this summer and that this summer conference will be ehld at Bishop College, Dallas, Texas.

Formally, I would like to request your approval to carry out the research study stated with the 13-Colleges Curriculum Program and also know whether the amount of financial aid stated in the cooperative research budget worksheet will be granted. In addition I would like to know the total number of colleges at present, the total number of teachers, the total number of teachers in science, the total number of new colleges to be added, total number of new teachers, and the total number of new science teachers. In addition I would like your verification as to where the summer conference is to be held and the beginning date for participants.

Since the development of instruments are so complicated and such a long drawn out task, it is urgent that I receive your reply at your most earliest convenience in order to precede in the development of instruments and other pertinent materials.

All efforts exhausted toward this matter will be greatly appreciated.

Sincerely,

Willie M. Clark

Enclosed: Copy of proposal

August 3, 1971

Dr. Tom Parameter, Evaluator
I.S.E.
13-Colleges Curriculum Program
Bishop College
Dallas, Texas 75241

Dear Dr. Parameter:

I have enclosed the list of numbers for the physical and biological sciences that were used for the test answer sheets and also on the questionnaires. I would appreciate your passing them on to the science coordinators, Dr. Goolsby and Dr. Colquitt so each participant who responded to the STEP Test and questionnaire may select and record the same number to be used on the post questionnaire.

Will be looking forward to seeing you this weekend.

Sincerely,

W. M. Clark

December 8, 1971

Dr. Charles M. Goolsby
Senior Program Associate for Biology
Institute for Services to Education
Washington, D.C.

Dear Dr. Goolsby:

Relative to our last telephone conversation concerning the biology participants' names and addresses. At the moment I am in the process of finalizing the Post-Questionnaires to be sent out the first week of December. The questionnaires will be the same format as the Pre-Questionnaires including the same items with the addition of one item, "The number of hours of science training."

I have already received the names and addresses of the Physical Science participants from Dr. Colquitt.

I would appreciate your forwarding the names and addresses of the Biological Science Participants and also a copy of your program schedule of past Summer Conferences at your most earliest convenience.

Sincerely,

Willie M. Clark

INSTITUTE FOR SERVICES TO EDUCATION
Incorporated
2001 S Street, N.W.
Washington, D.C. 20009

January 28, 1972

Mr. Willie M. Clark
Science and Mathematics
Teaching Center
McDonel Hall
Michigan State University
East Lansing, Michigan 48823

Dear Willie:

I was glad to receive your letter of January 25, because I can see from it that you are still at work collecting data. However, if you mailed questionnaires on January 11 it is much too soon to expect any response. Most schools were still on vacation until January 11, then went into final exam periods. We mailed requests for reports on December 15 and as of today we have received responses from 4 out of 14. What I suggest is that you write to the non-respondents every week until they respond. Of course, a few may never respond. But, if a concerted effort is made we find that most will answer. Let me know how you are doing about February 15.

Sincerely yours,

Charles M. Goolsby
Senior Program Associate
for Biology

CMG;jtf

APPENDIX N

**A LIST OF COLLEGES AND UNIVERSITIES
PARTICIPATING IN THE THIRTEEN-
COLLEGES CURRICULUM PROGRAM**

23

- | | |
|---------------------------------|---|
| 1. Alabama A&M University | 16. Lincoln University
(Penn.) |
| 2. Alcorn A&M University | 17. Mary Holmes College |
| 3. Atlanta University | 18. Memphis State Univ. |
| 4. Bennett College | 19. Norfolk State Univ. |
| 5. Bethune-Cookman
College | 20. North Carolina A&T
University |
| 6. Bishop College | 21. St. Augustine College |
| 7. Clark College | 22. Southern University
(Baton Rouge) |
| 8. Elizabeth City
College | 23. Southern University
(New Orleans) |
| 9. Fisk University | 24. Southern University
(Shreveport) |
| 10. Florida A&M
University | 25. Talladega College |
| 11. Grambling College | 26. Tennessee A&I
University |
| 12. Jackson State College | 27. Texas Southern
University |
| 13. Jarvis Christian
College | 28. University of Maryland
Eastern Shore |
| 14. Langston University | 29. Virginia Union Univ. |
| 15. LeMoyne-Owen College | 30. Voorhees College |

APPENDIX O

COMPARISON OF THE RETENTION STRENGTH BETWEEN
PROGRAM STUDENTS AND A RANDOM SAMPLE OF
REGULAR COLLEGE STUDENTS ENTERING TCCP
COLLEGES IN THE FALL, 1967

Continuance in College	Freshman Year Entering With- drew	Sophomore Year Entering With- drew	Junior Year Entering With- drew	Senior Year Entering
Program				
Number	1179	1011	810	737
Withdrawal (%) *	14.2%	19.9%	9%	
Continuing (%) *	100%	85.8%	68.7%	62.5%
Regular				
Number	839**	591	436	394
Withdrawal (%) *	29.6%	26.2%	9.6%	
Continuing (%)	100%	70.4%	51.9%	46.9%***

*Based upon the number continuing for each year independently.

**ISE collected entering data on more than 2000 regular college students; a 33 percent stratified (by college) random sample was then collected for continuing assessment purposes.

APPENDIX P

COMPARISON OF GRADE-POINT-AVERAGES OF PROGRAM
AND REGULAR STUDENTS ENTERING THE
SENIOR YEAR

		Continuing Grade-Point-Averages #								Cumulative Through Junior Year*
		Freshman Year 1st Term**	Freshman Year 2nd Term**	Freshman Year Total**	Soph. Year Program Courses	Soph. Year New-Program Courses*	Cumulative For Program Courses	Cumulative Through Soph. Year**	Junior Year Total	
Program N=716	Mean	2.55	2.56	2.55	2.58	2.38	2.55	2.50	2.41	2.49
	S.D.	.61	.64	.61	.69	.68	.58	.54	.69	.53
Regular N=379	Mean	2.14	2.19	2.16	--	2.33	--	2.29	2.41	2.36
	S.D.	.68	.70	.61	--	.56	--	.49	.64	.48

A Four-Point Scale (A=4.00)

*Significant difference at less than .05.

**Significant difference at less than .01.

***A poll of administrators suggests this is an overestimate. We have discovered serious problems in the verification of the 839 students as being identical through four years due to record keeping in some colleges. Some people different from the original 839 flowing into the sample may have inflated the percentage. A study of transcripts will clear up this problem.

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