DOCUMENT RESUME

ED 194 671 SE 031 740

AUTHOR Yager, Robert E.; And Others
TITLE The Iowa-UPSTEP Program. Final Report.
INSTITUTION Iowa Univ., Iowa City. Science Education Center.
SPONS AGENCY National Science Foundation, Washington, D.C.
PUB DATE Aug 80
GRANT NSF-SER-70-03314-A04
NOTE 232p.

EDRS PRICE MF01/PC10 Plus Postage.
DESCRIPTORS *Annual Reports; Elementary School Science; Elementary Secondary Education; Federal Programs; Higher Education; *Preservice Teacher Education; *Science Education; Secondary School Science; *State Programs

ABSTRACT

This final report includes information concerning the Iowa-UPSTEP Program, a preservice teacher education project first funded in 1970. Contents of this report include a discussion of the initial program outline; descriptions of general education and science program requirements that arose out of the Program; a history of the major phases of the Program; and other information concerning staff, students, budget, and projected activities for the Program after 1980. The Iowa-UPSTEP modules are described, including a rationale for their development, the outline followed for each module, and a listing of modules with synopses now available or soon to be available in elementary and secondary education, educational psychology, personalized teaching and learning, curriculum resources and teaching strategies, curriculum workshop and design, intern teaching, science in historical and philosophical perspective, and inservice education. A final section deals with the evaluation of the Program. Publications are also listed that involved the Iowa-UPSTEP Program. (CS)

The Iowa-UPSTEP Program

Final Report

NSF Grant # SER 70-03314 A04

August 1980

Robert E. Yager, Principal Investigator
Vincent N. Lunetta, Project Director
John E. Penick, Associate Project Director

Science Education Center
The University of Iowa
Iowa City, Iowa

Abstract

Iowa-UPSTEP was a pre-service teacher education project first funded in 1970. During 1970-75 a model emerged which included several basic components including:

1) preparation in the sciences that includes depth as well as breadth (we define depth as preparation comparable to a Bachelor's degree in science discipline and breath as including about half again as many experiences in other and/or related fields of science);
2) competencies in the psychological, sociological, and historical foundations of education;
3) competencies in performing certain skills needed for a variety of classroom teaching/learning modes;
4) personal flexibility that permits coping with change;
5) variety of experience with people of all ages that parallel experiences leading to greater scientific proficiency;
6) experience with the creative aspects of science and some specific analysis of the meaning of such experience;
7) an understanding of the philosophy, sociology and history of science and experience with the interaction of science and society.

In 1975 the project was extended with an evaluation and module development phase. This phase of the project operated from 1975-80. Several evaluation reports resulted as well as the production of several handbooks and instructional modules for use in inservice as well as preservice settings. The materials have been field tested at a variety of other institutions involved with teacher education.

The Iowa-UPSTEP Project: Final Report to NSF

Organization

I. The Iowa-UPSTEP Project, 1970-80

A. Program Outli[illegible]

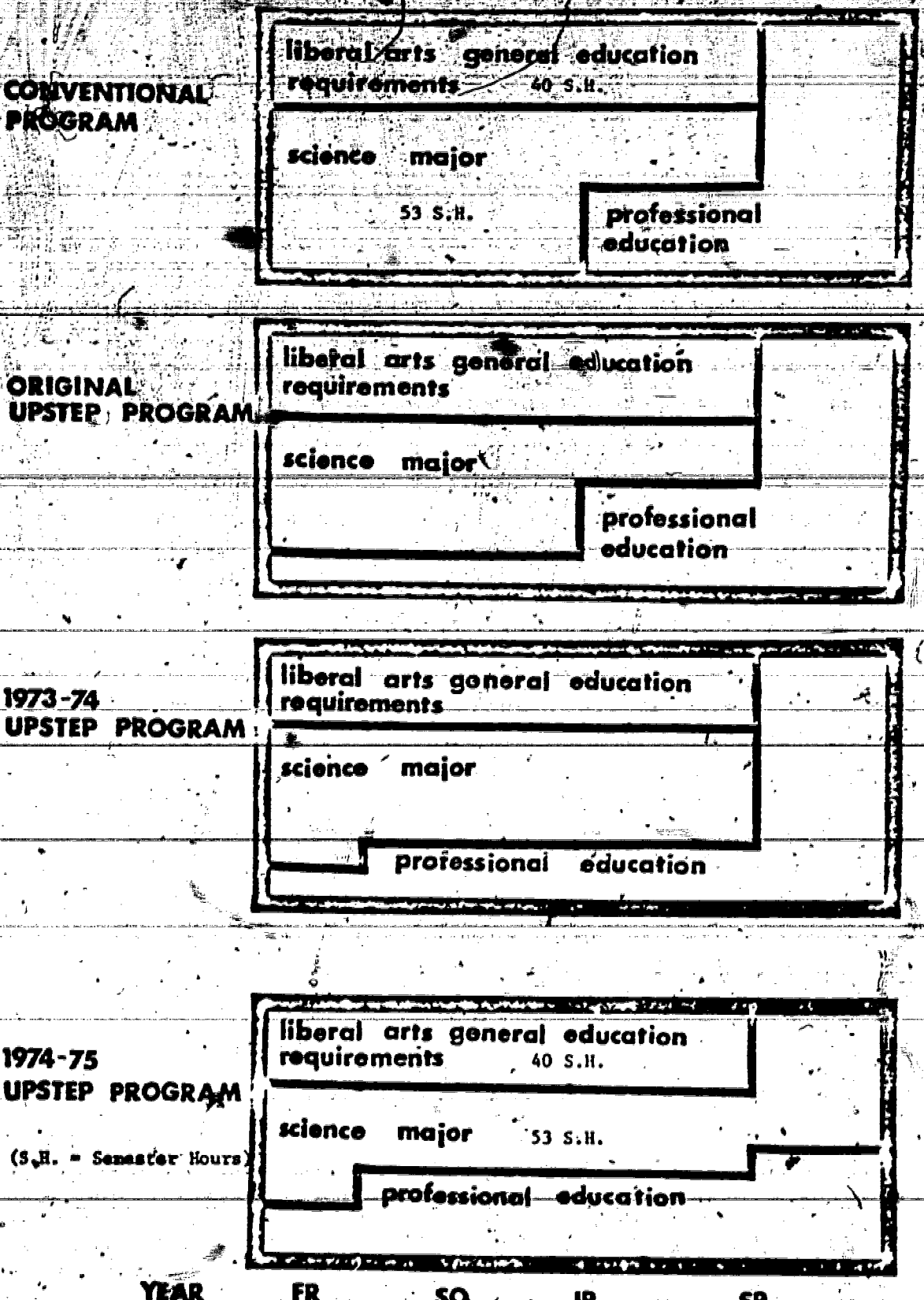
The Iowa-U[illegible]l was developed over a five-year period, 1970-75. In many respects the [illegible]ured during 1975--the last year for developmental support from the Natio[illegible]cience Foundation. The original proposal written in 1969 called for such support totaling $380,399 for a five-year period. In 1975 an evaluation and modular development effort was funded for a total of $170,679 more support. This evaluation and curriculum development effort was funded for a period of three years; later it was extended to five years. Iowa-UPSTEP has been funded by NSF for a ten-year period, 1970-80, for a total of $551,078.

Perhaps a review of the model that has evolved is an important place for this report to begin. Figure 1 provides a graphic portrayal of the program changes that have occurred while Figure 2 provides a pictorial overview of the professional sequence built within the series of models. The figures show that as the program evolved, the professional education sequence became more thoroughly integrated with the student's total program than it was in the conventional program (prior to 1970).

In the conventional program, which is further elaborated in Figure 3, professional courses in teacher education follow the major portion of the student's college program. The conventional program provided for little, if any, formal interaction between the professional education sequence of courses and the courses in the student's major science area. In fact, students were prevented by the program structure from pursuing these interests concurrently. They could not formally pursue science-related activities with children until late in their college careers, and the full semester of student teaching during their senior year precluded concurrent work in their scientific areas of interest at that time.

FIGURE 1

IOWA UPSTEP: PREPARING SCIENCE TEACHERS



IOWA UPSTEP

PROFESSIONAL EDUCATION SEQUENCE

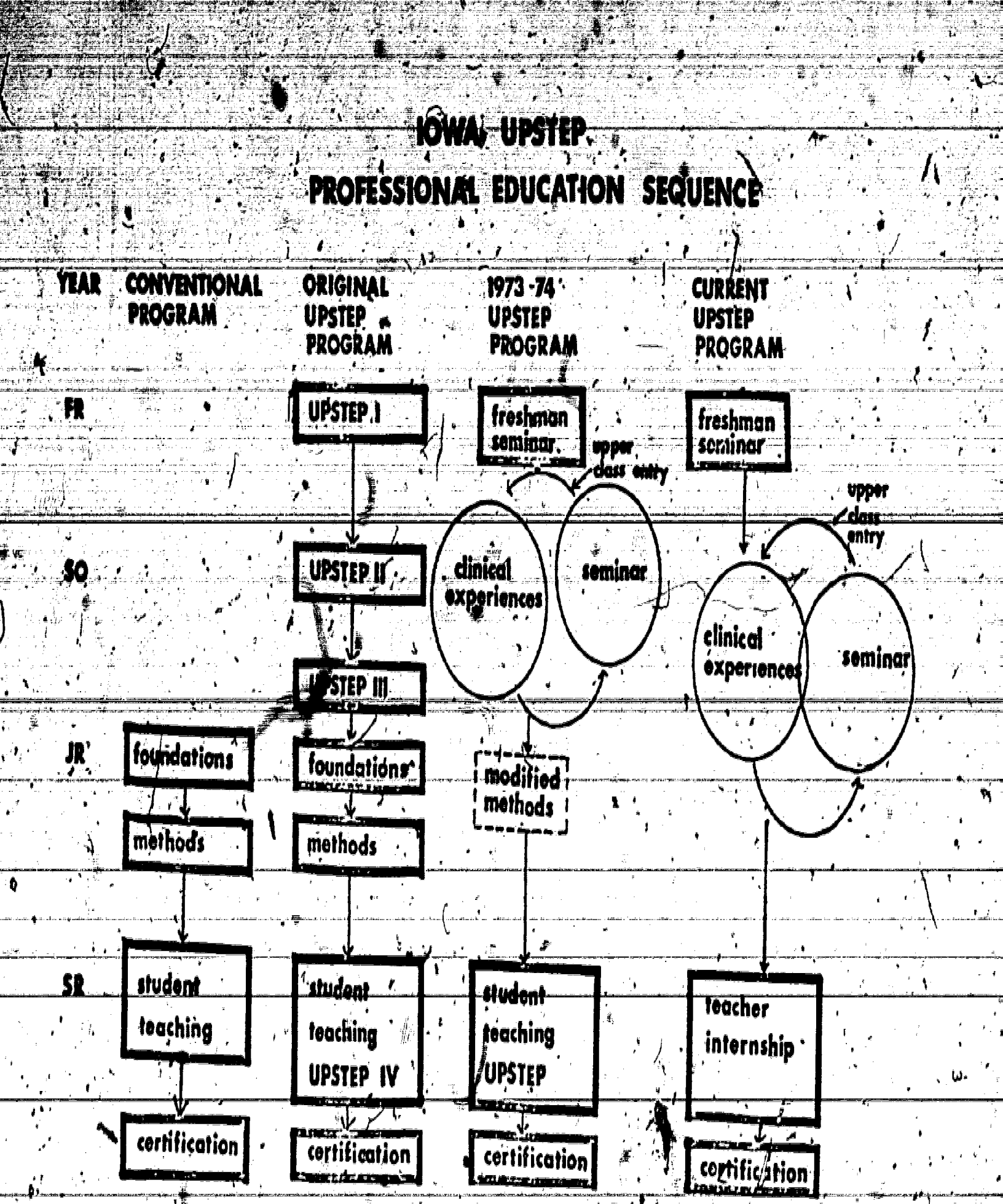
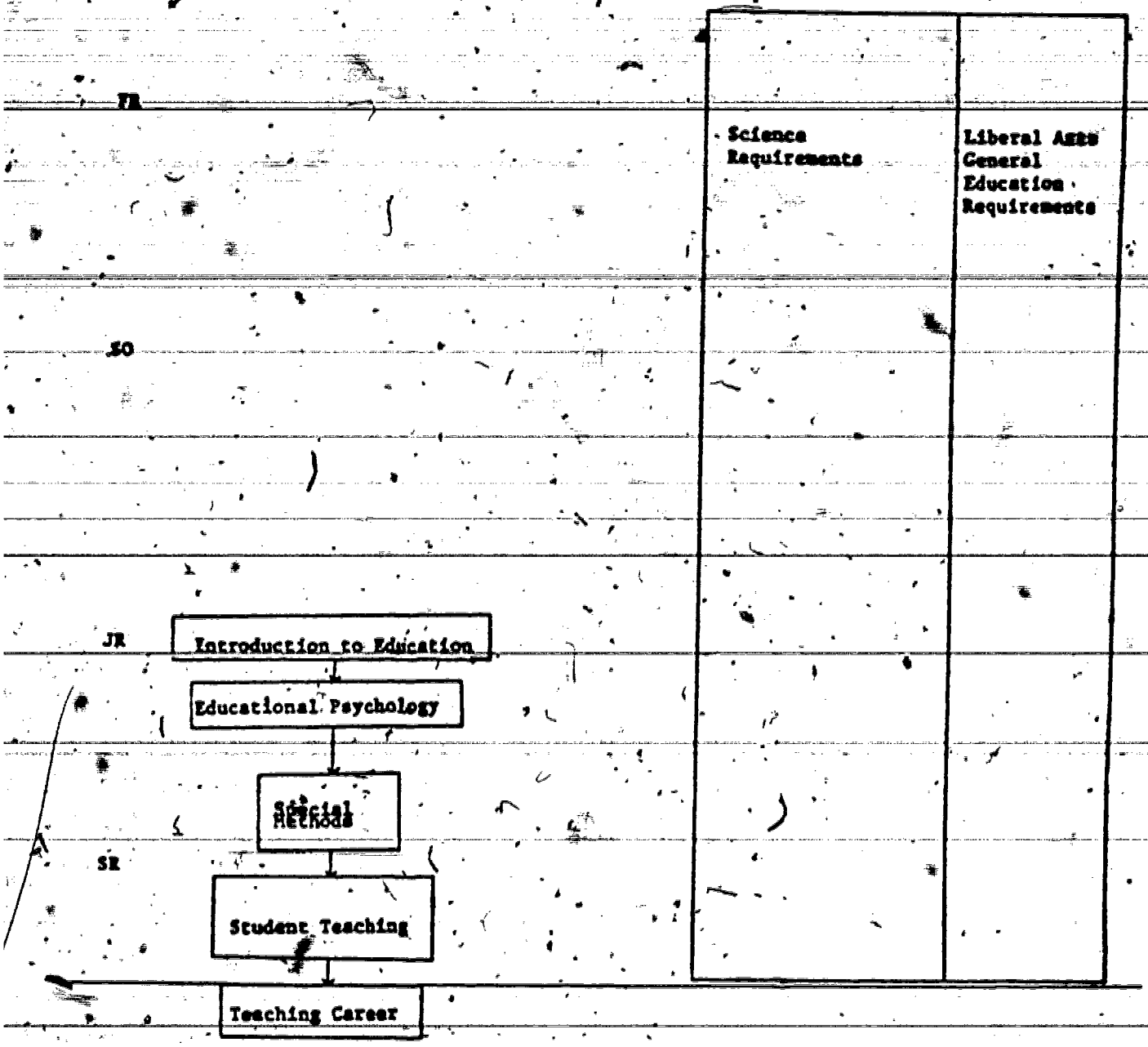


FIGURE 2

FIGURE 3

Science Teacher Education

Conventional Program



IOWA UPSTEP PROFESSIONAL EXPERIENCES

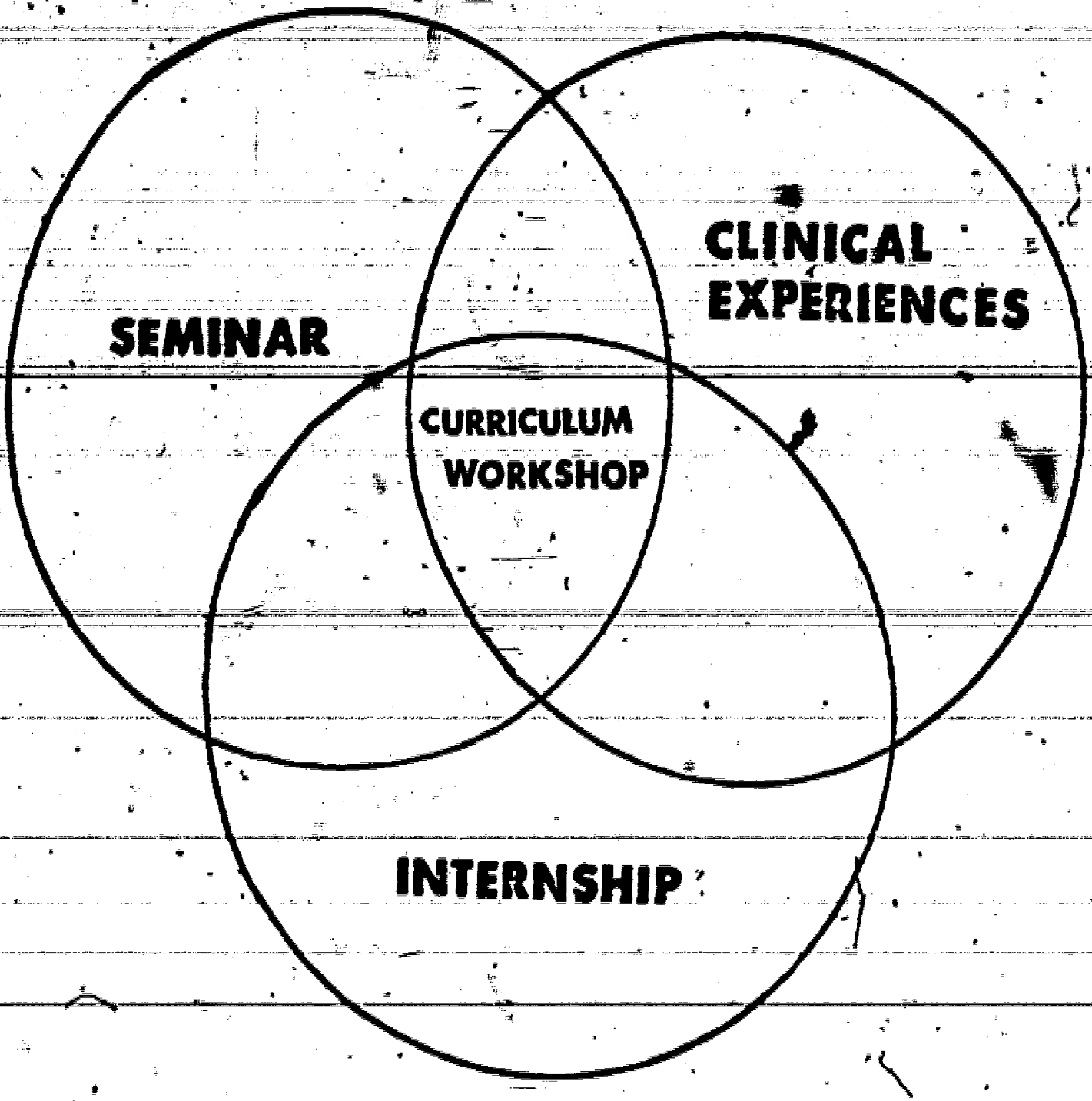


FIGURE 4A

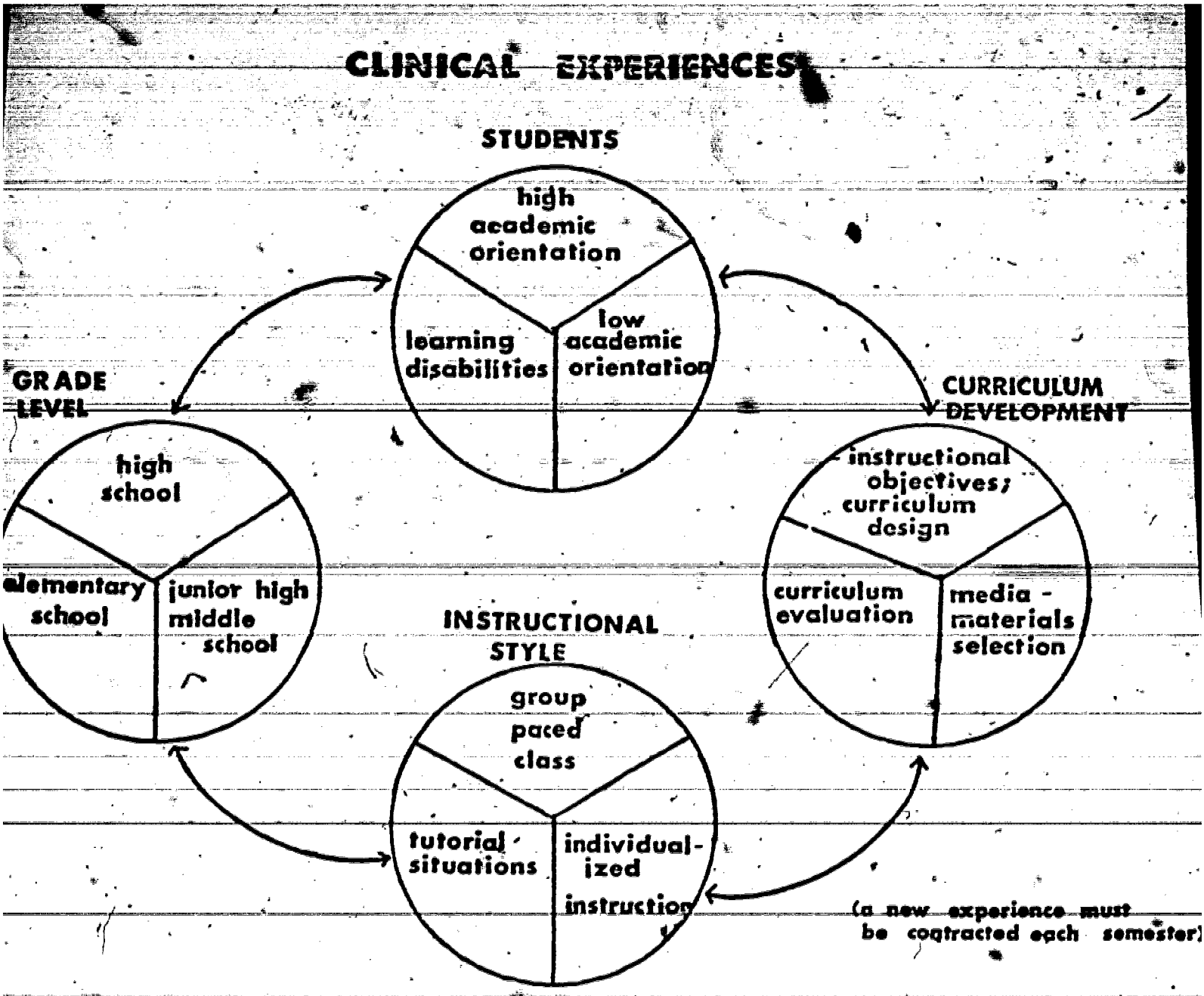
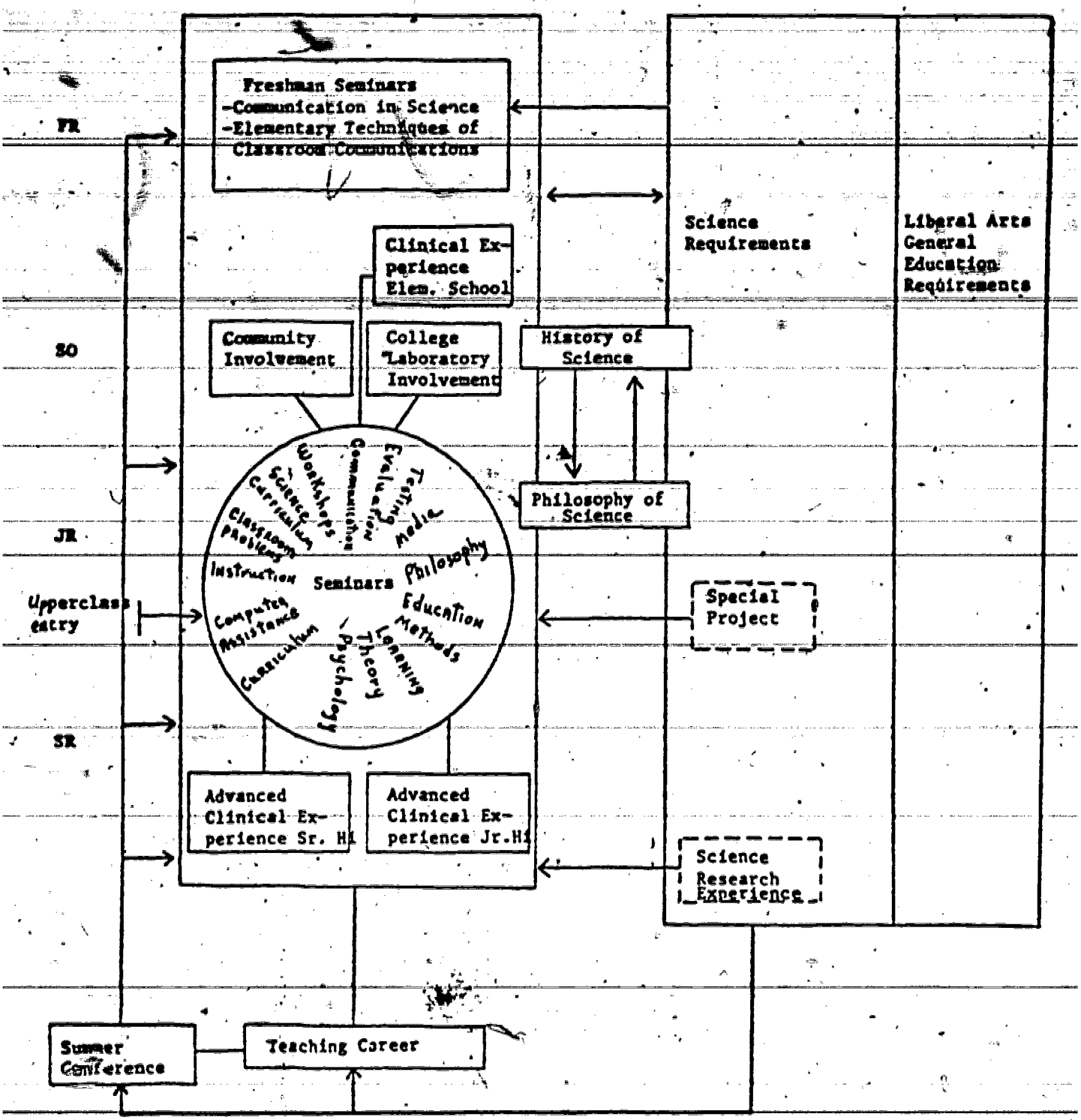

CLINICAL EXPERIENCES
STUDENTS
high academic orientation
learning disabilities
low academic orientation
GRADE LEVEL
high school
elementary school
junior high middle school
CURRICULUM DEVELOPMENT
instructional objectives; curriculum design
curriculum evaluation
media - materials selection
INSTRUCTIONAL STYLE
group paced class
tutorial situations
individual-ized instruction
(a new experience must be contracted each semester)

FIGURE 4B

FIGURE 4C

Iowa-UPSTEP

Current Program



In the current UPSTEP program portrayed in Figures 4A, 4B, and 4C, seminars and coordinated clinical experiences introduce science-oriented UPSTEP students to issues and strategies in science education early in their college years. These students also enroll in courses in history and philosophy of science which have been designed especially for persons with an interest in science education. Students may now enter the UPSTEP program at the beginning of any semester. Although an optimum four-year sequence has been designed, we want to allow science-talented students to use the program as a vehicle for exploring teaching as a career. We also know that many potentially talented science teachers do not develop that interest until after their initial college years. Hence, we believe that the UPSTEP program should have entry points for new students each semester. When students do elect to enter the program, they select a clinical experience in cooperation with the staff and enroll in the seminar series. The upperclass program is now heavily centered around clinical experiences and coordinating seminars. These clinical experiences include activities related to teaching in a variety of school and community settings. UPSTEP students select assignments in college laboratories, in a hospital school, and in elementary, junior high, and high school classrooms. They assist students, teachers, coordinators, and principals in performing specific tasks (Figure 4B).

The circle at the center of the model in Figure 4C represents the effort to integrate thoroughly all aspects of the activities in professional education. Concurrent with increased emphasis on clinical experiences throughout the college years, there is a reduction in the student teaching requirements which consumed one full semester in the conventional program. Students in the current program enroll for the same number of credit hours in professional education courses as do students in the conventional program. The new program,

Junior Year. Junior students take two methods-seminar courses in successive semesters. One of these courses includes an array of clinical experiences in the schools including: (1) development and evaluation of a self-instructional module, (2) levels of intellectual development, (3) slow learner/fast learner case studies, (4) individualizing instruction, (5) human relations skill development, (5) inquiry/discovery teaching and learning. Students in this course are involved and progress through a series of experiences in the Self-Instructional Laboratory. (This lab provides models, resources, and assistance for the design and production of self-instructional modules.) The other junior course provides an intensive review of curriculum resources utilizing the new Interactive Curriculatorium. (This laboratory is a center where UPSTEP students and teachers can interact with materials and explore the strategies of new science curricula.) In this course students are involved in simulated teaching experiences, and they perform numerous lab activities their own students will use in the public schools.

Summer Program. The Summer Conference is one of the most valuable features of Iowa-UPSTEP. It is designed to break down pre-service/in-service barriers in teacher education. The program provides two major options for junior students: (1) the students can work as teacher-interns and counselors in the various activities of the SSTP program with high school students (teaching on campus or on extended field trips to natural areas such as Yellowstone National Park); or (2) the students can serve as staff in the UPSTEP Summer Curriculum Workshop for teachers. In that capacity, the undergraduate students help the teacher participants review the resources relating to their own curriculum development objectives and to prepare materials and

plans to meet those objectives. Some of these students continue to work on these projects in the schools in a student teaching capacity during the ensuing fall semester.

Senior Year. Teacher-interns participate in an advanced clinical experience that is similar in some respects to student teaching, though normally the experience does not consume a full time semester. Teacher interns assume responsibility for planning and teaching secondary science classes under the supervision of a cooperating teacher. In addition they fulfill a number of "skill" requirements as part of the UPSTEP program. The advanced experience may continue at a reduced pace throughout two semesters, and it may be paired with selected teaching experiences in classes for UPSTEP underclassmen.

The use of clinical experiences in teacher education provides a convenient means to combine the skills and perspective of the university environment with the realism of the public school classroom. The current UPSTEP model has the potential for producing exemplary teachers who have depth in science, breadth in educational competencies, and a variety of experiences with students and teachers in the classroom.

B. General Education and Science Program Requirements

The science teacher education program consists of three major parts. These are: the science major, the general education requirements, and the professional sequence. Each of these is a part of Iowa-UPSTEP. However, the greatest flexibility (and hence change) has occurred with the professional sequence. At times "Iowa-UPSTEP" becomes synonymous with the professional sequence and how this sequence can (and has) influenced the program in the other two areas.

Iowa-UPSTEP when broadly conceived and defined means the total program. Iowa-UPSTEP has conscientiously moved toward minimizing the somewhat artificial interface separating the three phases of the program. However, there may be merit in specifically describing the general education sequence and the various emphases comprising the science teaching major before looking more carefully at the various facets of the professional sequence which is often termed "Iowa-UPSTEP". (A graphic representation of the various components of the total Iowa-UPSTEP program is displayed in Figures 1 and 4C in the preceding section.)

The General Education Sequence

The student with a science teaching major must complete the same general education sequence as required of all students in the College of Liberal Arts at the University of Iowa. Since some choice of such courses is a possibility, counseling concerning the most desirable choices is available. In general, all students must complete forty semester hours of credit in the area of general education. One hundred twenty-four semester hours are required for graduation.

Since all science teaching majors complete over fifty semester hours of credit in the sciences in addition to the professional sequence, there is no general education requirement in the sciences. Credit in mathematics, social science, historical/cultural area, foreign language, literature, physical education, and rhetoric are required. Each of these facets of the general education sequence will be discussed.

The specific requirement in mathematics varies depending upon mathematics completed in high school, entrance scores on the American College Tests, and major field. If a student has completed two and one-half years of high school mathematics and/or scores a minimum of twenty-three on the mathematics section of the American College Tests, there is no further mathematics requirement *per se*. However, all general science majors are urged to complete mathematics to include pre-calculus (elementary functions). In addition, all chemistry and physics teaching majors must complete one full year of calculus. All biology teaching majors must complete a special pre-calculus course for students in the biological sciences. All of these requirements usually mean that science teaching majors have more than fulfilled the general education requirements in mathematics automatically.

An eight hour block in social science must be elected from a long list of possibilities by all students unless they are excused by special examination. Students planning to teach science are urged to complete this eight hour requirement by completing eight semester hours from introductory courses in political science, sociology, geography, and psychology. All persons applying for a teaching certificate in Iowa must have a course in American Government. The course in political science meets this requirement as well as providing credit toward the social science general education requirement. Students majoring in earth science teaching or teaching of environmental studies must take a course in geography. Again, completion of a geography course satisfies a general education as well as a major requirement for these students. Courses in sociology and psychology are considered of value for teaching science in modern secondary schools.

As in the case of social science, the electives which will meet the eight hour requirement in the historical/cultural area are numerous. Science teaching majors are urged to complete courses in the following areas to meet this general education requirement in western civilization, problems in human history, and/or philosophies of man. Unlike the social science area, none of these courses is useful in fulfilling dual requirements. Nonetheless, it is believed that the right electives are important in developing the background and the experiences needed for a superior science teacher.

Unless two years of a single foreign language for the Bachelor of Science Degree (or four years of a given foreign language for the Bachelor of Arts Degree) were completed in high school, additional work in the same language or credit in another language is needed. For the student with no

previous work in foreign language in high school, one year or eight semester hours of credit must be completed for meeting the Bachelor of Science requirements or two years (12-16 hours) must be completed for persons desiring the Bachelor of Arts degree. It is recommended that all science teaching majors complete language study in the area of French, German, or Russian.

All students must complete one year (eight semester hours of credit) in literature unless they successfully pass the requirement by examination. It is recommended that students majoring in science teaching complete this requirement by completing two courses (all providing 4 s.h. of credit) from the following list: The Interpretation of Literature; Narrative Literature; American Lives; and The Classical View.

All students must register for physical education for one year. They may complete credit by examination or on a pass/fail basis. It is recommended that this requirement be met by conditioning as well as experience with recreational sports such as golfing, tennis, canoing, bowling, fencing, swimming, hand ball, volley ball, and others.

Unless the scores on the American College Testing Program are unusually high, students must complete four to eight semester hours of credit in rhetoric (writing and speaking skills emphasized). There is no choice concerning alternative courses. The rhetoric requirement is considered basic and must be started at the first registration at the University and continued until it is satisfied.

Most students in science teaching would complete the general education requirements of the University in the following manner: Rhetoric - 8 s.h.; Literature - 8 s.h.; Foreign Language (French) - 8 s.h.; Social Science (Political Science and Georgraphy) - 8 s.h.; Historical/Cultural (Problems of Human History) - 8 s.h.; Physical Education - 2 s.h.

It would not be uncommon for a student needing only 4 s.h. of rhetoric or for having completed the foreign language in high school. However, most students who complete our program average forty semester hours in the area of general education.

The Science Teaching Major

General science is a major program area in the College of Liberal Arts at the University of Iowa. It represents one of the largest programs in terms of students enrolled. Basically the major requires forty-four semester hours of credit in at least three departments including biochemistry, botany, chemistry, geology, mathematics, microbiology, physics, and zoology. Twenty hours of the total must be in one department with additional hours in two other departments.

The general science major was initially established for prospective science teachers. However, it now is the most popular program for pre-medical students, pre-dentistry students, and students desiring degrees in Liberal Arts in such allied health fields as physical therapy and medical technology. In most of these cases the students complete only the minimal forty-four hours of credit in these departments.

The science teaching majors all follow the basic plan for the degree in general science. However, as teaching competencies have become more precise in the secondary schools of the sixties and seventies, specific program emphases have been developed to meet these needs. Today there are emphases in biology, chemistry, earth science, environmental studies, and physics. Each of these five programs represent a fifty-six semester hour science teaching major. These five emphases are described as follows:

1) Biology Emphasis. This emphasis consists of introductory courses in botany and zoology with advanced courses in genetics, ecology, physiology, and evolution. Electives in biology are required to provide a minimum total

of twenty-seven hours. In addition, twenty-six semester hours are required in chemistry through organic, historical geology, introductory physics, history and philosophy of science.

2) Chemistry Emphasis. The teaching emphasis in chemistry requires courses through physical chemistry, a course which has a course in calculus as a prerequisite. Credit in physics is required. In addition, a course in astronomy is needed for certification in general science. History and philosophy of science courses are required as they are in the other emphases.

3) Earth Science Emphasis. Credit in geology, geography, and astronomy are required. Basic courses in biology, chemistry, and physics are also a part of the program. Balance between historical and structural geology must be attained with supporting courses in physical geography, meteorology, and astronomy. History and philosophy of science courses are also required as a part of the total of fifty-three hours.

4) Environmental Studies Emphasis. This is the only emphasis that meets only the minimal requirements in general science. This is because environmental studies is viewed as an interdisciplinary teaching field where special courses in the social studies, the humanities, engineering, environmental health are important. Most of these fields are not usually a part of the general science major. Because of the breadth of the area it is easiest to see and to illustrate the connections among professional, general education, and courses comprising the science major within this emphasis. History and philosophy of science is again incorporated into the plan.

5) Physics Emphasis. The physics emphasis consists of a concentration in physics with all basic courses required. All courses, including the most basic ones, require a year of calculus and in most cases two courses beyond. In all cases, students with this major complete all requirements

(except for the methods courses in mathematics) for the minor in mathematics teaching. Courses in chemistry are required to meet minimal certification requirements in this field as well. Again history and philosophy of science are required courses.

All five of the science teaching emphases are rigorous programs where students compete and interact with majors in the respective departments. In most cases the general science teaching major is very similar to a major in the department while providing some considerable breadth and preparation in other related areas. At least half of the courses in each of the respective concentrations are at the hundred level which means that graduate students may also be enrolled for credit for graduate degrees.

Although a research project is required only in the environmental studies program in general science, such experience is a required part of the Iowa UPSTEP model. Hence, all science teaching majors are now involved in at least one science department as an undergraduate research student. Many of the teaching majors also gain teaching experience as assistants in elementary laboratories as well. In some cases this experience is counted as academic credit in the particular science department.

Although many courses are required and others have specific prerequisites, there is flexibility in planning programs to meet the specific general science requirements. Every effort is made to prepare students for specific kinds of teaching assignments in the secondary school (grades seven through twelve). All such programs do meet the basic general science requirements of the College of Liberal Arts while meeting the fifty-six semester hour level for the science teaching major.

The History-Philosophy Sequence

The history-philosophy component of the Iowa-UPSTEP program stems from a commitment to a broadened conception of the meaning of "science teaching". "Teaching science" is often conceived to be the relaying of an accurate and up-to-date version of the knowledge contained in the natural sciences. This conception of science teaching is compatible with a conception of science as it was during the Newtonian era. So viewed, science is the product of logical reasoning applied to dispassionate observation of natural phenomena. As such, it is a certain, absolute, and immutable description of Nature. "Change" is a matter of accumulation, resulting in a more complete description. The activity of the scientist is isolated both in the sense of being unique in character and in the sense of being an "intellectual island" insulated from the contemporary culture. If this characterization of science were valid, science teaching could reasonably be conceived as a simple matter of inducing students to absorb the current fund of descriptive information. In fact, to the considerable extent that one's view of science teaching is conditioned by his image of science, it would be difficult to envision the teaching of science in any other way.

Within such a narrow conception of science and science teaching the task of teacher-preparation is a relatively simple matter. The teacher education program would need only to provide for mastery of the specific items of information to be taught and of the skills involved in purveying those items. This conception of science, however, is an archaic one. The corollary conception of science teaching is still rather widely held for a variety

of reasons, including lack of familiarity with the nature of modern science, the pragmatic value of such a conception in the case of preparing future scientists, and the burden of unexamined tradition. Teachers prepared by programs based on this conception are trained in "textbook science" and are capable of providing their pre-college students with a similar expertise. Despite widespread claims concerning the need for this sort of science education in a science oriented culture, honesty forces an admission that the need is a modest one. The life of the average person is such that their ability to function is not seriously affected by a lack of textbook knowledge of science.

From its inception, the Iowa-UPSTEP program has involved what is believed to be a more adequate conception of science teaching. The view of the science teacher as primarily a purveyor of the current paradigms of science has been rejected in favor of a concept both better fitted to the needs of society and in closer agreement with the character of contemporary science. Generally speaking, the science teacher is conceived as not only being trained in science, but educated about science as well. Perpared in this way, the Iowa-UPSTEP graduate is inclined toward a sort of enriched teaching of science for which the more narrowly prepared teacher is totally unprepared.

It would be convenient if the prospective teacher obtained the desired education about science from his courses in science. While those courses do communicate an image of science, it is a grossly distorted image. The major ingredient of the collegiate science course, the textbook, is designed

to induce commitment efficiently to current paradigms in the discipline, and not to serve as the source of an accurate conception of science. Unfortunately, the two tasks seem to be inimical to each other and consequently the incidentally created image of science is something to be overcome later. While the future scientist may modify his image of science when he enters research, the future science teacher will very likely never do so unless some special provision is made in his collegiate program.

The Iowa-UPSTEP program makes this provision in the form of two specially designed science education courses. The experiences provided in these courses are intended to revise and significantly broaden and deepen the student's understanding of science until it is reasonable to claim that he is educated about science. Given that common goal, these two courses are structured as complements of each other. In one case the focus is on a cultural-philosophical perspective of science. The readings discussed deal with topics such as the scientist's responsibility to society, the debate concerning explanation in science, the relative and pragmatic qualities of "truth" in science, the limitations imposed by the uncertainty principle, the reality status of quacks and other such entities, the role of creativity in science, laws and theories as different kinds of knowledge, and so on. In the second case, the focus is on a sociological-historical perspective of science. Discussions revolve around such topics as textbook vs. historical concepts of development in science, the sociological basis for claims of objectivity, revolutionary vs. evolutionary and other views of change in science, the scientific establishment's reaction of heterodoxical theories, governmental influence on the direction

of research, etc. The research on the effectiveness of these courses which has been completed to date is limited in scope. The results have been positive, however. A three-year longitudinal study is currently in its last semester.

The Application of Science Sequences

Courses focusing upon the educational and societal applications of biology, chemistry, earth science, environmental science, and physics have been initiated as capstone courses for the teacher education graduate. At least two of these applied courses are required, one of which can be completed with the final internship (student teaching) experience in the schools.

The aim of the applied courses is to utilize the knowledge from the core science courses in considering major societal issues that involve science and technology. Every student must become involved with a problem; students must collect data that can provide new information for discussion and problem resolution.

For many students, these courses provide the first experience with using information for something more than mastery for its own sake. Students see a different purpose for studying science; they experience a different kind of teaching and learning.

The courses represent one place in the total program where the experience with college science exemplifies an approach to teaching and learning that can be modeled in the secondary school. The courses emphasize student initiative in identifying problems, collecting direct evidence, developing arguments for given positions, suggesting actions.

The Summer Program

Iowa-UPSTEP students have the opportunity to participate in one of two special experiences in the summer:

(1) work as teacher interns and counselors in various activities of the Secondary Science Training Program (SSTP) with high school students;

(2) service as staff members in the UPSTEP Summer Curriculum Workshop for teachers.

(1) SSTP: The first of these options involves work as a teacher intern and resident counselor with secondary students participating in SSTP at the University of Iowa. The Science Education Center has developed a broad series of SSTP activities over the past twenty years that provide enrichment in the sciences for high school students. Iowa-UPSTEP students have been involved as teacher interns and resident counselors in both the course-based programs on campus and the environmental programs in the field. The course-based programs range from special topics in molecular biology to computer science. The environmental programs provide extended field trips to natural areas such as Yellowstone National Park, the Colorado Rockies, and the "Canadian Wilderness". Under the supervision of certified teachers on the SSTP staff, these activities can provide a unique opportunity for UPSTEP interns to acquire supervisory and teacher experience. The program also provides opportunity for the teacher intern to get to know secondary students through close and intensive daily contact.

(2) Summer Curriculum Workshop: The second option for summer activity for Iowa-UPSTEP students involves participating as staff members in the UPSTEP Curriculum Workshop for Teachers. Primary objectives of the UPSTEP Summer Workshop are:

(a) to provide experiences for Iowa-UPSTEP students in the solution of "real-world" curriculum problems and in communication with teachers about real issues;

(b) to assist regional school districts and individual teachers in developing effective science curricula.

Teachers and/or school districts are invited to participate in the summer workshop through brochures and other announcements describing the program. The workshop is directed toward the development of plans and materials for local curriculum implementation. Iowa-UPSTEP staff and undergraduate interns are assigned to participants to assist with activities focusing upon development of appropriate curriculum materials and strategies to solve problems identified by the teacher participants prior to the summer workshop.

In the workshop application, the teacher participant defines the curriculum problem to be work on during the 2-3 week on campus phase of the program. While on campus, he works in a team with others who have similar curriculum goals. Activities in the workshop are structured around the goals of the participants. They emphasize the collection of resource materials to assist in addressing the problem that has been defined, and the development of ideas and strategies for local implementation. The undergraduate interns are assigned to specific teams, and they

assist in all phases of team activity. They participate in the deliberations of the team, in the collection and review of resources, and in the development of curriculum materials. They also are participants in general sessions of the workshop.

Summer Curriculum Workshops often begin with group activities designed to facilitate group interaction and to help participants clarify and refine their own curriculum objectives. Subsequent large group, small group, and independent activities were designed primarily to facilitate the attainment of those individual objectives. A review of the curriculum development activities of past workshops indicates several clusters of objectives:

(1) development of individualized modules;

(2) development of life science mini-courses;

(3) development of health and family life programs:

(4) development of specific resources and activities to supplement conventional science curricula.

Where possible, the UPSTEP staff has attempted to support academic year implementation of the curricula and strategies developed in the summer workshop. Such support is not only of value to the teacher participants and their respective schools, but it also provides an outstanding opportunity for the teacher intern to follow a curriculum development effort through to the difficulties and challenges of implementation. Some of the interns have continued to work with the teachers in ensuring implementation efforts during the Fall semester in a student teaching role. When such an arrangement has been made, the UPSTEP intern is involved in evaluation of the curriculum development effort.

C. The Major Phases of Iowa-UPSTEP Program

1) The recruitment phase (prior to enrollment as freshmen). Various recruitment devices have been used in identifying thirty new freshmen participants each year. School visitations (many in cooperation with recruitment for Junior Academy and Secondary School Training Program Participants) continue as a major activity. About twenty-five percent of the new UPSTEP students result from previous participation in a summer SSTP program -- usually following the junior year in high school. A fall symposium held on the campus each fall also results in a significant number of new program applicants (about twenty-five percent). Teachers involved in UPSTEP Summer Conferences and/or teachers involved in various Project ASSIST activities assist with recruiting another twenty-five percent of the new students. Faculty advisors, student-student contacts, and unsolicited inquiries result in the remaining twenty-five percent of the new participants. A study of the relative effectiveness in terms of completion of the program and quality of participation remains to be completed.

2) The freshman experience. The freshman year is now characterized with a series of seminars and courses designed to introduce students to the University, to leading scientists, to human awareness activities, and to the career field of education. Results from questionnaires, opinionnaires, and other survey instruments permit us to conclude that these freshman experiences produce measurable gains in terms of student perception concerning the nature of science and scientists, concept of self, understanding of basic concepts and procedures in secondary education, ability to communicate and to relate to others.

3) The sophomore year. The experiences typically occurring at the sophomore year include early exploratory experiences in schools, special seminar series concerned with learning theory and measurement skills, courses in philosophy and history of science. Data have been collected regarding how the early exploratory experiences affect the philosophy of teaching, views toward such concepts as discipline, teacher role, curriculum, individualization, and student evaluation. Since the experience with the special seminar concerning learning theory and measurement skill has been incorporated into the model only recently, there is little information concerning the effects of such experiences upon our participants. In contrast, UPSTEP students have been involved with experiences in philosophy and history of science since the very beginning of the Iowa-UPSTEP program. In 1973 Robert Boes conducted a major study concerning the impact of such courses upon students, especially the pre-service science teacher. The special philosophy and history of science sequence results in student growth in areas of understanding the nature and meaning of science, ther interrelationships of science and society, and science as a human activity and a major area for thought. Further work is needed in terms of measuring the relationships of these experiences to later study of science and later teaching of science.

4) The junior year. The typical activities for the junior year consist of two methods courses-- one directly related to an initial internship experience and the preparation of learning materials (especially modules produced in our self-instruction laboratory), and the other related to learning resources (especially) related to experiences in our interactive curriculatorium). Experience to date enables us to report that students can produce usable and effective learning modules; they can analyse their relative worth and redevelop them with improvements; they can work with students in trying new

materials; they do have knowledge of most of the new curricular materials; they can demonstrate their ability to perform laboratories and other activities from the new programs. The attitudes as well as specific skills of these third year studies continue to be more positive concerning science and teaching.

5) The summer program. Between the junior and senior year, an opportunity exists for UPSTEP participants to work with in-service teachers in special curriculum revision projects and/or to be involved as staff members in science programs for the motivated high school student (SSTP) and/or the unmotivated secondary school student (Upward Bound). We have been able to measure student increased awareness of the operation of school programs, problems of in-service teachers, and the nature of secondary school curriculum. Also, the summer program enables students to increase their skills in working with secondary school students and in developing learning materials. Differences can be observed between students involved in such summer experiences and those who have not been involved.

6) The senior internship. This normal experience at the senior year includes extended and advanced experiences as teaching interns in courses in various science disciplines at various academic levels and often involving more than one master teacher. Again, the 1974-75 academic year was our first experience with this part of the model as common practice. Indications are that the resulting teachers are less like the single model that occurs when students are placed with a single cooperating teacher in one school and in one discipline for student eaching. Interns with such variations of experience appear more flexible, more confident, more knowledgeable, and more enthusiastic. We continue to collect information while awaiting the opportunity for measurement of specific differences that new in-service teachers demonstrate over teachers produced with more conventional internship experiences.

Specific competency lists are being formulated for each aspect of the Iowa-UPSTEP model. At this point in time these lists are still incomplete and techniques for observing and measuring their attainment remain to be perfected. Such observations and measurements represent major information of our formative evaluation efforts. Indeed, they have provided the basis for the development of the model as it exists today. Such evaluation efforts are a fundamental part of the model and will continue to affect its nature and its form.

Although there is much information available regarding the effectiveness of the Iowa-UPSTEP model and various features that comprise it, the model has changed significantly since its beginning in 1970. In fact, there are few students that have been produced from a four year program that have experienced the model as it currently exists. Teachers have entered the field as in-service teachers in numbers significant enough to study during the 1977-80 academic years. The following years as well as those of the last three years will result in significant total numbers (and specifically numbers that have experienced the complete current program) that can be studied for continuation of our evaluation efforts.

We have followed the work centered in the Association for the Education of Teachers of Science (AETS) as the 1973 In Search of Promising Practices in Science Teacher Education volume prepared and published. We were involved with Ronald Atwood's analysis and synthesis of the information in this volume. We participated and helped conduct the AETS national analysis of competency-based program. We are aware of and have assisted with the AACTE's most recent calls for more cooperative teacher education programs that are fully field-based. In this time of great concern for improved teacher education programs, however, we are reminded of the concerns expressed in the ROSES report in 1968. Newton and Watson indicated then that the courses and programs studied and identified in their major national survey were almost entirely acts of faith. There was little or no feedback or follow-up information to support the practices that any

institutions followed. They commented upon the complete and stricking lack of basic and objective evidence concerning effectiveness of teacher education programs. It was in recognition of this major problem that the Iowa-UPSTEP plan has been and continues to be predicated upon the position that the model must be submitted to careful scrutiny and continuous study concerning its strengths and weaknesses. This kind of search for information must continue until student graduates who have experienced the current model are employed as teachers and their performance studied in comparison with others if the potential for Iowa-UPSTEP is to be realized. Certainly major study of the Iowa-UPSTEP graduates as in-service teachers will represent the most significant evaluation of the model that is possible. We look forward to a comprehensive study of Iowa-UPSTEP: 1968-70 -- the embryonic phase; 1970-75 -- the developmental phase; 1975-80 -- the formative evaluation phase; and 1980 and beyond -- the continued growth and development of a program. We expect new evaluation efforts to provide focus and insight for science teacher education. It will provide the needed information for establishing the strengths (and weaknesses) of the model based on evidence and direct observations rather than upon faith which has characterized the situation in the past when such evaluation was not conducted.

D. The Iowa-UPSTEP Staff, 1970-80

One problem experienced as Iowa-UPSTEP has matured involves significant staff changes through the years. Also, it has not always been apparent who is primarily (or even partially) involved with UPSTEP as opposed to other activities at the Science Education Center. The current staff involved with the mature model (all University funds include):

Vincent Lunetta, Director

John Penick, Associate Director

George W. Cossman, History and Philosophy of Science

Edward L. Pizzini, Recruitment and Capstone Courses

Daniel S. Sheldon, Environmental Studies and Capstone Courses

Avi Hofstein, Seminar Coordinator, Research and Evaluation

Bill Kyle, Teaching Assistant (Sophomore)

Antonio Mendez, Teaching Assistant (Junior)

John T. Wilson, Capstone Courses

It may be of interest and value to compare the staffing pattern for each of the past "developmental" years (1970-75) and the evaluation/curriculum development years (1975-80). Following is a listing of staff concerned with Iowa-UPSTEP, 1970-80. (An asterisk indicates salaries provided by UPSTEP grant).

1970-71	1971-72
Central Staff	**Central Staff**
Robert E. Yager, Director	Robert E. Yager, Director
*Ronald D. Townsend, Co-Director	Ronald D. Townsend, Associate Director
*Louis A. Gatta, Instructor	*William L. Sharp, Assistant Director
*Robert Mitchell, Instructor	*Charles L. Frederick, Instructor
*Jean Blumgren, Graduate Assistant	*Eileen Mays, Graduate Assistant
	*Helen M. Foster, Graduate Assistant
Other Professorial Staff	*William P. McCall III, Graduate Assistant
George W. Cossman	
Darrell G. Phillips	**Other Professorial Staff**
	George W. Cossman
Other Graduate Assistants	Darrell G. Phillips
Melton E. Golman	Edward L. Pizzini
David L. Camp	Daniel S. Sheldon
Jacob A. Saville	
William P. McCall	**Other Graduate Assistants**
Makram I. Himaya	Larry Camp
James P. Hale	Robert Mitchell
	Kenneth Osicki
Research Assistant	William Moore
Donald J. Brown	

1972-73

Central Staff

Robert E. Yager, Director

*William L. Sharp, Associate Director

Vincent N. Lunetta, Assistant Director

*Charles F. Philp, Instructor

*Barton K. Phillips, Instructor

Other Professorial Staff

George W. Cosman

Darrell G. Phillips

Gary E. Downs

Edward L. Pizzini

Daniel S. Sheldon

Other Graduate Assistants

Leon J. Zalewski

Charles L. Frederick

Gerard F. MacMillan

Eileen M. Mays

Mohammed A. Kishta

Barbara C. Brooks

Gaylen R. Carlson

Donna L. Siemro

Carole J. Reesink

1973 Summer Conference Staff

Central Staff

Robert E. Yager, Director

*Eileen M. Mays, Associate Director

*Ronald D. Townsend, Visiting Professor

*Barton K. Phillips, Instructor

*J. Harvey Hensley, Instructor

*Robert H. Fronk, Instructor

*Virginia Phillips, Instructor

*Gordon E. Odegaard, Teaching Assistant

*Charles F. Philp, Teaching Assistant

*Roger L. Child, Teaching Assistant

*Charles Frederick, Teaching Assistant

Other Professorial Staff

William L. Sharp

George W. Cosman

Edward L. Pizzini

Daniel S. Sheldon

Other Graduate Assistants

Herbert G. Cohen

Marc L. Pelletier

Susan Haupt

1973-74

Central Staff

Robert E. Yager, Director

*William L. Sharp, Associate Director

Vincent N. Lunetta, Assistant Director

*Marc L. Pelletier, Instructor

*Leon J. Zalewski, Instructor

Other Professorial Staff

George W. Cossman

Darrel G. Phillips

Gary E. Downs

Edward L. Pizzini

Daniel S. Sheldon

Other Graduate Assistants

Gordon E. Odegaard

Larry A. Kelsey

Jerry Doyle

W. Tony Heiting

Willis Horak

Sandra Pellens

Classie Hoyle

Vicki Schumann

1974 Summer Conference Staff

Central Staff

Robert E. Yager, Director

*Vincent N. Lunetta, Associate Director

*W. Tony Heiting, Administrative Assistan

*Jerry Doyle, Instructor

*Willis Horak, Instructor

*Sandra Pellens, Instructor

*Vicki Schumann, Instructor

Other Professorial Staff

William L. Sharp

George W. Cossman

Edward L. Pizzini

Daniel S. Sheldon

Darrell G. Phillips

Gary E. Downs

Other Graduate Assistants

Classie Hoyle

Larry A. Kelsey

1974-75

Central Staff

Robert E. Yager, Director

Vincent N. Lunetta, Associate Director

*Leopold B. Smigelski, Assistant Director

*Jerry J. Doyle, Instructor

*W. Tony Heiting, Instructor

Sandra K. Pellens, Instructor

Vicki R. Satern, Instructor

Other Professorial Staff

George W. Cossman

Darrell G. Phillips

Gary E. Downs

Edward L. Pizzini

Daniel S. Sheldon

Other Graduate Assistants

Roger L. Child

David F. Treagust

Charles F. Philp

John Cody

1975 Summer Conference Staff

Central Staff

Robert E. Yager, Director

Vincent N. Lunetta, Associate Director

*Leopold B. Smigelski, Assistant Director

*Vicki R. Satern, Instructor

*Herbert K. Brunkhorst, Instructor

*Sandra K. Pellens, Instructor

*W. Tony Heiting, Instructor

Other Professorial Staff

George W. Cossman

Edward L. Pizzini

Daniel S. Sheldon

Darrell G. Phillips

Gary E. Downs

1975-76

Central Staff

Robert E. Yager, Director

Vincent N. Lunetta, Associate Director

John Penick, Assistant Director

Herbert K. Brunkhorst, Instructor

Ed van den Berg, Instructor

Sandra Pellens, Instructor

David Treagust, Instructor

*Pinchas Tamir, Research Associate

Other Professorial Staff

George W. Cossman

Darrell G. Phillips

Daniel S. Sheldon

Edward M. Pizzini

Grant Assistants

*William Kyle

*Ronald Bonsetter

*Mike Goldberg

*Kathleen D. Filkins

Other Graduate Assistants

1976-77

Central Staff

Robert E. Yager, Director

Vincent N. Lunetta, Associate Director

John Penick, Associate Director

*Pinchas Tamir, Research Associate

*Robert Hardingham, Research Associate

Michael J. Wavering, Instructor

Herbert K. Brunkhorst, Instructor

Ed van den Berg, Instructor

Gerry D. Haukoos, Instructor

Other Professorial Staff

George W. Cossman

Darrell G. Phillips

Daniel S. Sheldon

Edward M. Pizzini

Grant Assistants

*Kathleen Filkins

*Mike Goldberg

*William Kyle

*Sandra Pellens

Other Graduate Assistants

Richard Huber

Jay Wortman

1977-78

Central Staff

Robert E. Yager, Principle Investigator

Vincent N. Lunetta, Director

John Penick, Associate Director

*Larry Yore, Research Associate

*Shimson Novick, Research Associate

*Ralph Plagman, Research Associate

Ed van den Berg, Instructor

James K. Wooster, Instructor

Michael J. Wavering

Other Professorial Staff

George W. Cossman

Darrell G. Phillips

Daniel S. Sheldon

Edward M. Pizzini

John T. Wilson

Grant Assistants

*Bille Kyle

*Mike Goldberg

*Mike Wavering

*Marlene Fuhrman

Other Graduate Assistants

1978-79

Central Staff

Robert E. Yager, Principle Investigator

Vincent Lunetta, Director

John Penick, Associate Director

*Ralph Plagman, Research Associate

Charles Krueger, Instructor

Michael Wavering, Instructor

Wayne Finkbeiner, Instructor

Other Professorial Staff

George W. Cossman

Darrell G. Phillips

Daniel S. Sheldon

Edward M. Pizzini

John T. Wilson

Grant Assistants

*Marlene Fuhrman

*Mike Goldberg

*Ed van den Berg

Other Graduate Assistants

1979-80

Central Staff

Robert E. Yager, Principal Investigator

Vincent N. Lunetta, Director

John Penick, Associate Director

Avi Hofstein, Research Associate

William Kyle, Instructor

Antonio Mendez, Instructor

Other Professorial Staff

George W. Cossman

Darrell G. Phillips

Daniel S. Sheldon

Edward M. Pizzini

John T. Wilson

Other Graduate Assistants

Becky Priest

Bruce Cook

Tom Azeke

E. The Iowa-UPSTEP Students

Although one important feature of the Iowa-UPSTEP model is early entrance and exit points into and out of the program, relative stability in terms of participants in the program contineus as a problem. Much of the student change has been attributed to staff change. Much too has been the attractiveness of other professions and our own willingness to treat the UPSTEP experience as a general education function. An important effort of Iowa-UPSTEP may be felt in community leadership of persons who enter professions other than education.

The number of students enrolled in the Iowa-UPSTEP program during each of the years 1970-80 follows:

	Freshmen	Sophomores	Juniors	Seniors	Graduates	Total
1970-71	30					30
1971-72	32	25				57
1972-72	28	24	18	3	12	85
1973-74	31	18	19	13	15	96
1974-75	29	21	19	15	18	102
1975-76	26	26	19	20	21	112
1976-77	23	21	24	19	18	105
1977-78	32	20	21	19	20	112
1978-79	24	27	26	20	18	115
1979-80	21	18	21	18	16	94
Totals	276	200	167	127	138	908

F. The Iowa-UPSTEP Budget

The initial grant awarded in 1969 for a three year period totaled $113,150. The planned extension of the developmental effort (1973-75) resulted in an added $135,250 grant. As indicated in the previous proposals, the University also supported the development of the UPSTEP model with staff and materials totaling $199,011.

Since this is the end of the developmental phase, it is deemed appropriate to summarize the expenditures on a yearly basis. The following outline is an attempt to outline the categories of expenditures each year 1970-75.

1970-71 UPSTEP Budget

	NSF Funds	Amount Spent
Administration		
Yager	$ 0.00	$ 0.00
Instruction		
Townsend	$ 0.00	$ 0.00
Graduate Assistants (2)	4500.00	4544.44
Instructor	6000.00	5650.00
Secretarial	$4500.00	$4423.39
Fringe		
Secretarial	$ 495.00	$ 106.01
Graduate Assistants	525.00	673.55
Travel	$2000.00	$1757.80
Supplies		
Office	$1750.00	$2040.55
Instruction	1000.00	1147.80
A.V.	500.00	600.00
	$21,270.00	$20,943.54

1971-72 UPSTEP Budget

	NSF Funds	Amount Spent
Administration		
Yager	$ 0.00	$ 0.00
Instruction		
Townsend	$ 3,487.00	$ 3,487.00
New Assistant Professor	10,000.00	10,000.00
Instructor	3,000.00	3,666.00
Secretarial	$ 4,800.00	$ 4,206.90
Fringe		
Staff	$ 1,882.00	$ 1,968.00
Secretarial	528.00	463.00
Graduate Student	150.00	183.00
Travel	$ 1,000.00	$ 1,450.81
Supplies		
Office	$ 1,000.00	$ 880.63
Instruction	500.00	1,775.06
A.V.	500.00	500.00
	$26,847.50	$28,580.90

1972-73 UPSTEP Budget

	NSF Funds	Amount Spent
Administration		
Yager	$ 0.00	$ 0.00
Instruction		
Townsend	$ 3,714.25	$ 2,500.00
Sharp	10,000.00	10,000.00
Instructors (2)	6,000.00	7,200.00
Secretarial	$ 5,120.00	$ 4,690.56
Fringe		
Staff	$ 1,920.00	$ 1,750.00
Secretarial	563.20	515.96
Graduate Student	300.00	360.00
Travel	$ 1,000.00	$ 445.48
Supplies		
Office	$ 800.00	$ 1,440.00
Instructional	500.00	553.00
A.V.	300.00	50.00
	$30,217.45	$29,505.00

Summer 1973

	NSF Funds	Amount Spent
Participant Costs		
Stipends: (Six Week Program)		
30 UPSTEP Participants @ $60/week	$ 9,000.00	$10,800.00
15 Cooperating Teachers @ $60/week	5,400.00	5,400.00
5 Science Education Graduate Researchers @ $60/week	3,600.00	1,800.00
	$18,000.00	$18,000.00
Operating Costs		
Director	$ 2,000.00	$ [illegible]0.00
Co-Director	1,000.00	2,050.00
Secretary	500.00	1,062.00
Staff (2 full time)	6,000.00	6,220.00
Graduate Assistants (2)	2,000.00	2,200.00
Frontiers of Science Speakers (6)	800.00	300.00
Office Supplies	400.00	566.00
Instructional Supplies	400.00	600.00
Fringe Benefits @ 11%	1,265.00	491.00
	$14,365.00	$13,498.00
Overhead @ 15%	2,155.00	$ 2,155.00
Total Operating	$16,520.00	$15,644.00
Total Requested	$34,798.00	$33,644.00

1973-74 UPSTEP Budget

	NSF Funds	Amount Spent
Administration		
Yager	$ 0	$ 0
Instruction		
Sharp	$10,600	$10,650
Lunetta	2,650	2,650
Graduate Assistants	9,200	9,200
Secretarial	$ 5,300	$ 3,912
Fringe		
Staff	$ 1,855	$ 1,995
Secretarial	583	587
Graduate Students	460	460
Cooperating Teachers	$ 0	$ 0
Travel and Communication	$ 4,500	$ 821
Supplies		
Office	$ 800	$ 2,400
Instructional	1,500	4,703
	$37,448	$37,378

Summer 1974

	NSF Funds	Amount Spent
Participant Costs		
Stipends: (Two Week Program)		
12 UPSTEP Praticipants @ $60/week	$ 2,700	$ 1,440
25 Former In-Service Participants @ $60/week	1,800	3,000
5 Science Education Graduate Researchers @ $60/week	900	0
	$ 5,400	$ 4,440
Operating Costs		
Director	$ 1,000	$ 0
Co-Director	600	600
Secretary	250	1,464
Staff (2 full time)	3,000	3,000
Graduate Assistant	1,000	1,000
Office Supplies	250	281
Instructional Supplies	250	282
Fringe Benefits @ 11%	644	667
	$ 6,994	$ 7,294
Overhead @ 15%	$ 1,049	$ 1,049
Total Operating	$ 8,043	$ 8,343
Total Requested	$13,443	$12,783

1974-75 UPSTEP Budget

	NSF Funds	Amount Spent
Administration		
Yager	$ 0	$ 0
Instruction		
Smigelski	$11,236	$10,364
Lunetta	2,809	2,900
Graduate Assistants	9,200	8,950
Secretarial	$ 5,400	$ 5,682
Fringe		
Staff	$ 1,966	$ 1,990
Secretarial	594	852
Graduate Students	460	448
Cooperating Teachers	$ 0	$ 0
Travel	$ 4,500	$ 666
Supplies		
Office	$ 800	$ 1,026
Instructional	1,500	8,007
	$38,465	$40,885

Summer 1975

	NSF Funds	Amount Spent
Participant Costs		
Stipends:		
9 UPSTEP Participants @ $50/week	$ 2,700	$ 900
23 Former In-Service Participants @ $50/week	1,800	2,300
UPSTEP Awareness Conferences	900	2,200
	$ 5,400	$ 5,400
Operating Costs		
Director	$ 1,000	$ 0
Co-Director	600	600
Secretary	250	691
Staff (2 full time)	3,000	1,500
Graduate Assistant	1,000	1,000
Office Supplies	250	400
Instructional Supplies	250	550
Fringe Benefits @ 15%	644	569
	$ 6,994	$ 5,310
Overhead @ 15%	$ 1,049	$ 1,049
Total Operating	$ 8,043	$ 6,359
Total Requested	$13,443	$11,759

Total Budget Report

Total Received for 5 Years	$248,000
Total Spent (including indirect costs)	$243,462
Amount Remaining and Applied to 1975-76 Module Development	$ 4,938

In 1975 an additional $170,670 grant was awarded to complete formative evaluation and to prepare module materials to characterize the Iowa-UPSTEP model. Included was support for trial of the materials in other teacher education centers. With the amount remaining after the development effort, a total of $175,608 was available to support this extension of the program (1975-80). The yearly budgets follow.

September 1, 1975 - June 30, 1976

TOTAL IN GRANT: $175,608

A.	Salaries and Wages	
	1. Principal Investigator	$ 0
	2. Research Associates (Vincent Lunetta)	$ 5,895
	3. Research Assistants (William Kyle) (Sandra Pellens) (Ronald Bonnstetter) (Mike Goldberg)	$17,425
	4. Secretary	$ 0
	TOTAL SALARIES AND WAGES	$23,320
B.	Staff Benefits	$ 1,002
C.	TOTAL SALARIES, WAGES, & BENEFITS	$24,322
D.	Office Supplies	$ 1,303
E.	Evaluation Services	$ 391
F.	Evaluation Instruments	$ 0
G.	Instructional Materials	$ 409
H.	Travel to Centers	$ 616
I.	Travel for Consortium Members	$ 0
J.	Printing and Preparation of Modules	$ 7,861
K.	TOTAL DIRECT COSTS	$10,580
L.	Indirect Costs (57.55% of S&W)	$13,420
M.	TOTAL COSTS	$48,322

SUBTOTAL: $127,286

July 1, 1976 - June 30, 1977

Beginning Balance: $127,286

A.	Salaries and Wages	
1.	Principal Investigator	$ 0
2.	Research Associates (Vincent Lunetta) (Robert Hardingham) (Pinchas Tamir)	$ 9,839
3.	Research Assistants (Kathleen Filkins) (Mike Goldberg) (Sandra Pellens) (William Kyle) (2 - ½ t. graduate assistants)	$11,025
4.	Secretary (Thomas Rogers - hourly)	$ 3,000
	TOTAL SALARIES AND WAGES	$23,864
B.	Staff Benefits	$ 304
C.	TOTAL SALARIES, WAGES, & BENEFITS	$24,168
D.	Office Supplies	$ 1,200
E.	Evaluation Services	$ 600
F.	Evaluation Instruments	$ 2,000
G.	Instructional Materials	$ 1,001
H.	Travel to Centers	$ 1,500
I.	Travel for Consortium Members	$ 4,023
J.	Printing and Preparation of Modules	$ 4,692
K.	TOTAL DIRECT COSTS	$15,016
L.	Indirect Costs (57.55% of S&W)	$13,734
M.	TOTAL COSTS	$52,918

END OF YEAR BALANCE: $74,368

July 1, 1977 - June 30, 1978

Beginning Balance: $74,368

A. Salaries and Wages	
1. Principal Investigator (Robert Yager)	$ 1,500
2. Research Associates (Vincent Lunetta) (Larry Yore) (Shimshon Novick) (Ralph Flagman)	$14,056
3. Research Assistants (½ Summer 1977) Bill Kyle Mike Goldberg Mike Wavering Ac. Yr. - Kevin O'Dell (½ Summer 1978) Marlene Fuhrman Mike Wavering	$ 6,400
4. Secretary (Thomas Rogers)	$ 4,845
TOTAL SALARIES AND WAGES	$26,801
B. Staff Benefits	$ 1,488
C. TOTAL SALARIES, WAGES, & BENEFITS	$28,289
D. Office Supplies	$ 1,593
E. Evaluation Services	$ 809
F. Evaluation Instruments	$ 1,000
G. Instructional Materials	$ 1,196
H. Travel to Centers	$ 501
I. Travel for Consortium Members	$ 0
J. Printing and Preparation of Modules	$ 4,227
K. TOTAL DIRECT COSTS	$ 9,326
L. Indirect Costs (57.55% of S&W)	$15,424
M. TOTAL COSTS	$53,039

END OF YEAR BALANCE: $21,329

July 1, 1978 - June 30, 1979

		Beginning Balance: $21,329
A.	Salaries and Wages	
	1. Principal Investigator	$ 750
	2. Research Associates (Vincent Lunetta - 1 month, 1978) (Ralph Plagman)	$ 1,500
	3. Research Assistants (½ Summer 1978) Marlene Fuhrman Mike Goldberg Ac. Yr. - Ed van den Berg	$ 1,863
	4. Secretary (temporary)	$ 2,249
	TOTAL SALARIES AND WAGES	$ 6,362
B.	Staff Benefits	$ 143
C.	TOTAL SALARIES, WAGES, & BENEFITS	$ 6,505
D.	Office Supplies	$ 582
E.	Evaluation Services	$ 730
F.	Evaluation Instruments	$ 421
G.	Instruction Materials	$ 236
H.	Travel to Centers	$ 782
I.	Travel for Consortium Members	$ 408
J.	Printing and Preparation of Modules	$ 788
K.	TOTAL DIRECT COSTS	$10,452
L.	Indirect Costs (57.55% of S&W)	$
M.	TOTAL COSTS	$14,689
		END OF YEAR BALANCE: $ 6,640

July 1, 1979 - February 29, 1980

Beginning Balance: $6,640

A. Salaries and Wages	
1. Principal Investigator	$ 750
2. Research Associate	$ 0
3. Research Assistants	$ 0
4. Secretary	$ 0
TOTAL SALARIES AND WAGES	$ 750
B. Staff Benefits	$ 143
C. TOTAL SALARIES, WAGES, & BENEFITS	$ 893
D. Office Supplies	$1,700
E. Evaluation Services	$ 930
F. Evaluation Instruments	$ 451
G. Instructional Materials	$ 868
H. Travel to Centers	$ 0
I. Travel for Consortium Members	$ 20
J. Printing and Preparation of Modules	$1,777
K. TOTAL DIRECT COSTS	$7,180
L. Indirect Costs (57.55% of S&W)	$ 432
M. TOTAL COSTS	$7,071

END OF YEAR BALANCE: $ -431.00 absorbed by indirect costs)

G. Iowa-UPSTEP Beyond 1980

The Iowa-UPSTEP model is an integral part of science teacher education at the University of Iowa. All of the courses, the recruitment procedures, continuous involvement in the field, the five-year cycle, the special seminars continue to characterize the program as they have beyond 1975. During the past five years, funds have been used to prepare and to distribute modules, to construct and utilize assessment instruments, and to publicize the program. Many of these activities will continue. However, the general expense funds provided by the University are currently a limiting factor.

Calls from other science educators and other institutions continue to provide evidence of the success and attractiveness of the Iowa-UPSTEP model. The NSF funds have permitted us to develop a model that is attractive and transportable to other campuses.

Iowa-UPSTEP has also provided an attractive model for other disciplines in secondary education at the University of Iowa. Several areas such as language arts, mathematics, foreign language, social studies, and others have adopted certain features of Iowa-UPSTEP for their respective programs.

The Iowa-UPSTEP model has been the subject of several sessions at national and regional meetings of the Association of the Education of Teachers of Science (AETS). It is a major source of innovative materials distributed by AETS. The program has also been endorsed by the American Association of Colleges of Teacher Education (AACTE). A summer workshop of teacher education was held during the summer of 1980. Plans call for continued development, evaluation, and expansion of Iowa-UPSTEP.

II. The Iowa-UPSTEP Modules

A. Rationale for Modules

The Iowa-UPSTEP program for the education of teachers was developed to integrate theory with practice through a series of varied experiences in schools. One purpose of the NSF grant awarded in 1975 has been to prepare a series of modules enabling others in teacher education to understand the model and to utilize appropriate parts of the model. To that end, primary attention was given to the development of modules for the teacher educator that were embodied in the Iowa-UPSTEP program. However, some modules prepared had the potential to enchance the current program, even though they were not in use in 1975.

Each module covers a discrete unit of the program and was designed for the primary use of instructors in teacher education. Objectives for each module were delineated, and the modules included relevant materials and references for both the instructor and for teacher education students. Each module was designed to stand alone, if necessary, and contains a suggested calendar of activities prepared with the assumption that the module might not be used as part of an existing UPSTEP course. References are provided within each module to other relevant modules and materials.

At the University of Iowa related modules are grouped into semester length courses that are offered to pre-service students over a four year period. Overview booklets describe the general goals of specific courses and the modules composing these courses. Instructor's notes will provide comments on issues that need special attention such as placements of students in field experiences. Each course overview booklet also contains a suggested Calendar of Activities for the semester that references specific modules and sessions.

B. UPSTEP Module Outline

I. Title page: module number, title, author(s), copyright, place of publication.

II. Table of contents.

III. Overview page: Goals - brief statement of goals for the interns.
Rationale - paragraph summary of module's rationale.
Activities - paragraph summary of module activities.
Scheduling - special requirements including class time intervals and field assignments.

IV. Instructor's notes:

A. Introduction page - preliminary information for the instructor on such items as the structure of the module.

B. Suggested calendar of activities - summary of the module's sections. Activities (classwork, required assignments, and optional assigments) are designated by a capital letter and are listed sequentially in their respective sections.

C. Section notes* - each section should contain the following parts:

Description - a brief description of the section's activities.
Objectives - performance objectives that apply to specific section activities; these objectives should correlate with the Performance Objectives included in the Intern Materials.
Prerequisites - a list of activities interns should have completed prior to participation in the section's activities.
Materials - materials that the instructor or interns will need to complete a section's assignment or activities.
Activities outline - class activities for a section are listed and a minimum class time is indicated.
Suggested approach - class activities listed in the Calendar of Activities are expounded and described in greater detail here. Alternative ways to run the activities, optional activities, and relevant suggestions should be included.
Assignment - the assignments correspond to those in the Calendar of Activities, but they may be elaborated on here.

* Sections are the basic units in a module. Each section generally requires between 15 minutes and 1½ hours of class time; some instructors may use the materials in one section over several class sessions.

The Instructor's Notes for each section describe moderately structured activities and assignments, and provide a view of the way the module is used in Iowa City. It will be necessary for many instructors to modify the activities and assignments to meet the needs of their own programs.

The letters in the Instructor's Notes for each section correspond to the letters designating the various activities and assignments in the suggested Calendar of Activities.

D. Evaluation:

Intern - commentary on the evaluation of interns. (Instruments are included in the Intern Materials section.)
Module - commentary and instruments on evaluation of module effectiveness.

V. Bibliography. References used in preparing the module and for supplemental reading (including other relevant UPSTEP modules) are included here.

VI. Special reference materials. Special materials the instructor may find helpful are included here. Materials from this section may be distributed to interns, but they are primarily intended for the instructor.

VII. Intern materials*:

A. Title page - same as I (above) plus the words "Intern Materials."

B. Overview page - same as III (above) minus Scheduling paragraph.

C. Performance objectives - these objectives should include those listed in the various sections of the Instructor's Notes.

D. Introduction - a page or two elaborating upon the rationale for the module and explaining the format or procedures used in the Intern Materials.

E. Preliminary readings and activities - the body of this section should include materials that instructors duplicate for distribution to interns. Materials in this section should not be too specific with regard to assignments or evaluation, because many instructors will wish to modify parts of the module. Copyrighted articles should not be included in this section unless they are absolutely essential to module activities. A list of suggested readings should be included here with journals and authors cited. Such a list may be amended by instructors and interns in order to keep the module current.

F. Class activities - this section should include materials that are not to be distributed to interns until class time. Role-play prompt sheets, post-situation analysis sheets, and evaluation instruments are included here.

* The Intern Materials section is conceived as an entity. Instructors are expected to have this section duplicated in its entirety and to distribute a copy to each intern.

C. UPSTEP Course Overview Booklet Outline

Course Title:
Number of Semester Hours:
Location in Current Program:
Meeting and Field Experience Intervals:

General Goals Rationale Component Modules	(Approximately one typewritten page)
Table of Contents	
Instructor's Notes	(Sections that are referenced should have the same reference numbers used for the activity that appear in the Calendar of Activities.)
Administration Materials	(Sample form letters to cooperating teachers, administrators, etc.)
Evaluation System	
Intern Materials	(Primarily for students; relevant materials that are not contained in the modules.)
Calendar of Activities	(Each section within the course will be numbered sequentially and will be referenced to sessions of specific modules.)

D. Listing of Iowa-UPSTEP Modules

Status 2/80

Modules		Status (March 1980
Introductory UPSTEP Seminar (07:110)		
I-A.	Communicating Scientific Ideas - What is Science? - Who am I, and Where Do I Go From Here?	Trial ed. printed 11/78
Elementary Teaching Practicum (7S:91)		
II-A.	Understanding the Child	Not available for public dist.
II-B.	Activity-Centered Teaching of Science	Trial ed. printed 11/76
Introduction to Secondary Education (7S:100)		
III-A.	The Emergence of the Secondary School	Trial ed. printed 2/78
III-B.	The Changing Adolescent	Trial ed. printed 2/78
III-C.	Goals, Objectives, and Competencies	Trial ed. printed 3/78
III-D.	New Directions for Secondary Schools	Trial ed. printed 5/78
III-E.	Preparing to Teach	Trial ed. printed 10/78
III-F.	The Teacher at Work	Trial ed. printed 10/78
III-G.	Career Alternatives Within the School	Proposed
III-H.	Career Alternatives Outside the School	Proposed
Educational Psychology (7P:75)		
IV-A.	Child Growth and Development	Proposed
IV-B.	Theories of Learning	Proposed
IV-C.	Introduction to Student Evaluation	Trial ed. printed 8/77
IV-D.	Social Foundations of Schools & Communities	Proposed
IV-E.	Theories of Personality	Proposed
IV-F.	The Role of the Teacher	Proposed
Personalized Teaching and Learning (7S:151)		
V-A.	Individualizing Instruction	Rev. ed. printed 10/78
V-B.	Developing a Self-Instructional Module	Rev. ed. printed 3/78

V-C.	Evaluating Teachers' Classroom Behaviors	*Rev. ed. printed 10/78*
V-D.	Interpersonal Problems in the Classroom	*Trial ed. printed 2/77*
V-E.	Mastering the Human Relations Skills	*Trial ed. printed 2/78*
V-F.	Transactional Analysis in the Classroom	*Rev. ed. printed 5/78*
V-G.	Using Case Studies to Understand Students	*Trial ed. printed 11/76*
V-H.	Intellectual and Conceptual Development	*Trial ed. printed 10/76 revisions under way*
V-J.	Teaching Science As Inquiry	*Trial ed. printed 11/76 revisions under way*
V-K.	Classroom Group Interactions and Behavior	*Under way*

Curriculum Resources and Teaching Strategies (78:152)

VI-A.	Teaching the Life Sciences	*Proposed*
VI-B.	Teaching the Physical Sciences	*Proposed*
VI-C.	Selecting Program Goals and Materials: Minimodules	*Trial ed. printed 11/78*
	1. Content, Themes, and Objectives in High School Science	
	2. Sequencing Strategies	
	3. Evaluating and Selecting Curriculum Materials	
	4. The Science Department Game	
VI-D.	Strategies for Science Teaching: Minimodules	*Trial ed. printed 11/78*
	1. Exploring the Instructional Potential of Common Objects	
	2. Brainstorming Phenomena	
	3. Demonstrations in Science Teaching	
VI-E.	Evaluating Student Learning and Attitudes	*Trial ed. printed 8/77*
VI-F.	Teaching Laboratory Science	*Trial ed. printed 11-78 revisions under way*
VI-G.	Developing Laboratory Science Skills	*Trial ed. printed 11/78*
VI-H.	Laboratory Safety and Teacher Liability	*Trial ed. printed 11/78*
VI-J.	Developing Audiovisual and Machine Skills	*Under way*
VI-K.	Developing Large Group Teaching Skills	*Under way*
VI-L.	Examining Alternative Futures	*Proposed*
VI-M.	Using Models and Analogies in Science Teaching: Minimodules	*Underway*
	1. Models in an Educational Perspective	
	2. Are Models Real?	
	3. Investigating a Material Model	
	4. Analysis of an Analogy	
	5. The Classroom as a Biological Cell	
	6. The Basic Molecular Model Systems Used in Science Teaching	

Curriculum Workshop and Design (7S:190)		
VII-A.	Designing and Evaluating Curricula	*Proposed*
VII-B.	Preparing a Model Learning Unit	*Proposed*
Intern Teaching (7S:191/193)		
VIII-A.	Initiating Successful Student Teaching	*Trial ed. printed 10/78*
VIII-B.	Growth in the Process of Teaching	*Trial ed. printed 10/78*
VIII-C.	Student Teaching and Beyond	*Under way*
VIII-D.	Humanizing the Science Classroom	*Trial ed. printed 9/77*
VIII-E.	Resolving Games Students Play	*Proposed*
VIII-F.	Getting a Teaching Job	*Trial ed. printed 3/77*
VIII-G.	Evaluating Teaching Success	*Under way*
VIII-H.	Growing Professionally in Education	*Trial ed. printed 2/77*
Science in Historical and Philosophical Perspective		
IX-A.	Teaching the Nature of Science	*Trial ed. printed 4/78*
IX-B.	Teaching Science: An Historical Approach	*Proposed*
IX-C.	Bridging the Gaps Between Science & Society	*Proposed*
Inservice Education		
X-A.	Stimulating Student Learning Outside the Classroom	*Proposed*
X-B.	Facilitating School-Community Relationships	*Trial ed. printed 5/77*
X-C.	Curriculum Development Workshop	*Under way*
Course Overview Booklets		
I-O.	Introductory UPSTEP Seminar Overview	*Proposed*
II-O.	Elementary Teaching Practicum Overview	*Trial ed. printed 12/76*
III-O.	Introduction to Secondary Education Overview	*Proposed*
IV-O.	Educational Psychology Overview.	*Proposed*
V-O.	Personalized Teaching and Learning Overview	*Proposed*
VI-O.	Curriculum Resources and Teaching Strategies Overview	*Proposed*
VII-O.	Curriculum Workshop and Design Overview	*Proposed*
VIII-O.	Intern Teaching Overview	*Proposed*
IX-O.	Science in Historical and Philosophical Perspective Overview	*Proposed*
X-O.	Inservice Education Overview	*Proposed*

UPSTEP Handbooks

Elementary Teaching Practicum (7S:091)

II-S.	Handbook for the Pre-Education Practicum Student	*Printed 9/77*
II-T.	Handbook for the Pre-Education Practicum Cooperating Teacher	*Printed 9/77*

Personalized Teaching and Learning (7S:151)

V-S.	Handbook for the Personalized Teaching Practicum Student	*Proposed*
V-T.	Handbook for the Personalized Teaching Practicum Cooperating Teacher	*Under way*

Intern Teaching (7S:191/192)

VIII-S.	Handbook for Student Teaching	*Printed 8/77*
VIII-T.	Handbook for the Cooperating Teacher	*Printed 8/77*
VIII-U.	Handbook for the University Supervisor	*Under way*

Other UPSTEP Publications

O-A.	The Iowa-UPSTEP Model for Science Teacher Education	*Printed 1/75*
O-B.	Overview and Policies for Iowa-UPSTEP Module Development and Evaluation	*Printed 7/77*
O-C.	Current Description & Partial Evaluation of Iowa-UPSTEP (Penick, Lunetta, Kyle, Bonstetter)	*Printed 4/77*
O-D.	The Iowa-UPSTEP Program in International Perspective (Pinchas Tamir)	*Printed 3/76*
O-E.	Baseline Date Concerning Science Teacher Education Programs at the University of Iowa, 1955-1973 (R. Yager)	*Printed 1973*
O-F.	Iowa-UPSTEP Program Development from 1970 through 1975 (R. Yager)	*Printed 1975*

E. A Synopsis of UPSTEP Modules

II-A: *Understanding the Child*

Develops awareness of the ways children think and behave; also serves as an introduction to systematic observation.

II-B: *Activity-Centered Science Teaching*

Introduces reasons, strategies, and resources for activity-centered science teaching at the elementary level; develops skills in teaching science as inquiry.

III-A: *The Emergence of the Secondary School*

Gives background information on the development of secondary schools in the United States and introduces some contemporary issues involving the secondary schools.

III-B: *The Changing Adolescent*

Increases students' awareness of the characteristics and values of today's adolescents and tells about the impact of juvenile crime on the secondary schools. Background information on other youth-serving agencies is provided.

III-C: *Goals, Objectives, and Competencies*

Describes some of the goals that have been set for secondary schools and shows students the need for translating goals into instructional objectives. A lengthy "programed minitext" is included to help students understand the relationship between objectives, diagnosis, prescription, and evaluation. Minimum competencies are also discussed.

III-D: *New Directions for Secondary Schools*

Develops student awareness of recent recommendations for improving secondary education and acquaints students with the concepts of alternative education and action learning.

III-E: *Preparing to Teach*

Helps to make students aware of the tangible and intangible rewards of teaching. Provides information about job opportunities in education and about procedures for getting a job. Also acquaints students with teachers' professional organizations.

III-F: *The Teacher at Work*

Introduces students to lesson planning, to strategies for dealing with "problem behavior," and to professional responsibilities teachers have in addition to classroom duties.

IV-C: *Introduction to Student Evaluation*

Provides an introduction to testing and feedback, and provides experience in the design and use of oral questions and paper-and-pencil tests.

V-A: *Individualizing Instruction*

Introduces reasons and means for individualizing instruction; gives practice in techniques for individualizing instruction.

V-B: *Developing a Self-Instructional Module*

Provides an opportunity to develop and evaluate a self-instructional module; increases familiarity with such elements of curriculum planning as performance objectives and evaluation.

V-C: *Evaluating Teachers' Classroom Behaviors*

Develops skill in the use of the SATIC teacher interaction assessment system and shows how SATIC can be used to improve teaching behaviors.

V-D: *Interpersonal Problems in the Classroom*

Helps interns avoid interpersonal problems by focusing their attention on students' feelings, desires, attitudes, and values and encouraging constructive teacher response.

V-E: *Mastering the Human Relations Skills*

Provides readings and classroom exercises in the interpersonal skills of attending, paraphrasing, tagging feelings, perception checking, empathy, genuineness, confrontation, and contracting.

V-F: *Transactional Analysis in the Classroom*

Introduces Transactional Analysis and shows how it can be used in the classroom. Helps teachers understand, control, and evaluate themselves in classroom interactions.

V-G: *Using Case Studies to Understand Students*

Increases sensitivity towards students through the development of case studies; develops awareness of the implications of student characteristics for teaching and learning.

V-H: *Assessing Students' Intellectual Development*

Develops awareness of differences in students' perceptions and cognitive abilities. Introduces some characteristics of concrete and formal levels of intellectual development and explores the implications of intellectual development for teaching.

V-J: *Teaching Science as Inquiry*

Shows how to teach science as inquiry and by inquiry. Provides inquiry teaching experiences and an overview of inquiry resource materials.

VI-D: *Strategies and Resources in Science Teaching*

A series of 3- to 8-page minimodules dealing with such topics as demonstrations; using common objects; evaluating and selecting curricula; content, theme, and objectives in high school science; and sequencing strategies.

VI-E: *Evaluating Student Learning and Attitudes*

Provides an overview of evaluation and provides experience in the analysis, design, and use of non-paper-and-pencil tests, attitude inventories, and various evaluation procedures.

VI-F: *Teaching Laboratory Science*

Develops awareness of potential and limitations of the laboratory in science teaching, and develops teaching skills.

VI-G: *Developing Science Laboratory Skills*

Develops competencies in a variety of laboratory skills.

VI-H: *Increasing Laboratory Safety*

Provides an awareness of safety procedures for laboratories and field trips and gives an introduction to teacher liability.

VIII-A: *Goals and Expectations for Student Teaching*

Introduces the student teaching experience and helps in the development of teaching goals, unit and lesson plans, and performance objectives.

VIII-B: *Growth in the Teaching Process*

Helps to assess and improve teaching behaviors and to make them compatible with teaching goals.

VIII-C: *Student Teaching and Beyond*

Helps to evaluate the student teaching experience and to improve teaching behaviors.

VIII-D: *Humanizing the Science Classroom*

Provides an opportunity to improve, or "humanize," a laboratory or classroom, and to assess the effect of the learning environment or the teacher on students' attitudes towards science.

VIII-F: *Getting a Teaching Job*

Develops an awareness of placement office procedures and of the difficulty in finding a teaching job. Provides an opportunity for development of skills for communicating with prospective employers.

VIII-H: *Growing Professionally in Education*

Develops familiarity with professional organizations and programs, professional journals, and teacher organizations. Provides an opportunity for participation in professional meetings and activities.

IX-A: *Teaching the Nature of Science*

Develops awareness of philosophies of science and shows how to use both the historical approach and current social and moral issues in the teaching of science. Emphasizes the way scientific knowledge has developed, and points out the difference between science as inquiry and science as a rhetoric of conclusions.

X-B: *Facilitating School-Community Relationships*

Shows problems in school-community relationships and provides an opportunity for developing and evaluating school-community projects.

X-C: *Curriculum Development Workshop*

A curriculum workshop for inservice teachers.

UPSTEP Handbooks

II-S: *Handbook for the Pre-Education Practicum Student*

Lists requirements, responsibilities, and activities of the Pre-Education Practicum (7S:91) and gives the student some guidelines for making the practicum a successful experience.

II-T: *Handbook for the Pre-Education Practicum Cooperating Teacher*

Gives the cooperating teacher suggestions for making the practicum experience more fulfilling for himself and his practicum students.

VIII-S: *Handbook for Student Teaching*

Lists requirements, responsibilities, and activities for the Intern teaching semester (7S:191/192) and answers questions about student teaching.

VIII-T: *Handbook for the Cooperating Teacher*

Gives the cooperating teacher suggestions for making the student teaching semester a valuable experience for himself and for his interns.

Other UPSTEP Publications

O-A: *The Iowa-UPSTEP Model for Science Teacher Education*

Describes the genesis and development of Iowa-UPSTEP and tells about some of the innovations Iowa-UPSTEP has brought to the Science Education Center at the University of Iowa (1/75).

O-B: *Overview and Policies for Iowa-UPSTEP Module Development & Evaluation*

Tells about the module development program and how the modules fit in with the UPSTEP philosophy of science teacher education. Describes the modular format and tells what should be included in an UPSTEP module (7/77).

O-C: *Current Description and Partial Evaluation of Iowa-UPSTEP* (Penick, Lunetta, Kyle, Bonnstetter, 4/77).

O-D: *The Iowa-UPSTEP Program in International Perspective* (P. Tamir, 3/76).

O-E: *Baseline Data Concerning Science Teacher Education Programs at the University of Iowa, 1955-73* (R. Yager).

O-F: *Iowa-UPSTEP Program Development for 1970 through 1975* (R. Yager).

F. Module Overview Sheets

Module II-A: Understanding the Child

Goals:

1. To increase intern awareness of the ways children think and behave.
2. To introduce interns to methods of systematic observation.

Rationale:

The incorrect assumptions that are often made about children can best be corrected by objective observations. The elementary school experience gives interns a good opportunity for making such observations, since at the elementary level there is less concern about knowledge of subject matter than at the secondary level.

Activities:

Interns identify children's behaviors, identify characteristics of classroom behavior, and use systematic methods for collecting data on classroom behavior. They administer Piaget-type tasks to elementary students. They also discuss the stages of intellectual development and their implications for the teaching of science.

Scheduling:

The module involves about six seminar sessions and an associated practicum of about three hours a week in an upper elementary classroom. The module should be used concurrently with module II-B; *Activity-Centered Science Teaching*.

Module II-B: Activity-Centered Science Teaching

Goals:

1. To enable interns to become familiar with the reasons, the strategies, and the resources for activity-centered science teaching at the elementary level.
2. To give interns practice in activity-centered teaching.
3. To familiarize interns with activities that are process-specific rather than content-specific.

Rationale:

Because of the rapid changes in science and society, teachers today should be preparing children for success in a world of unknown dimensions. People who are trained under fact-formed curricula will be less able to adapt to this new world than those who are trained under curricula emphasizing scientific inquiry. The inquiry approach to science teaching is aimed at the development of skill in observing, interpreting data, forming concepts, formulating and testing hypotheses, making inferences and generalizations, and communicating ideas. To develop these skills, students are given extensive direct contact with materials and phenomena and are encouraged to discover, interpret and generalize for themselves.

People who are thinking of become teachers should be exposed to such curricula because (among other things) their experience has probably been heavily oriented toward factual content taught in teacher-dominated classrooms, and they ought to experience other curriculum models.

Activities:

The module begins with an activity that focuses on attitudes toward teaching. Other activities provide an understanding of the goals, the rationale, and the resources of the activity-centered classroom. The teaching/learning methods in these activities can be carried over to activity-centered inquiry-teaching in the classroom. The interns teach and participate in activities that are appropriate for elementary science teaching.

Module III-A: The Emergence of the Secondary School

Goals:

1. To provide background information on the development of secondary schools.
2. To increase student awareness of contemporary controversial issues involving the secondary schools.
3. To show the importance of evaluation in the evolution of U.S. secondary schools.

Rationale:

A student who is contemplating following a profession should have at least a perfunctory knowledge of the history of that profession and of some of the current issues involving the profession. This is as true of education as it is of law or medicine.

Activities:

Activities include committee investigations, class and small-group discussions, and individual reports. Most of the activities are open-ended and can easily be expanded, changed, or deleted to fit the requirements of a particular instructor.

Scheduling:

The module requires about eight 50-minute class sessions. It is one of a number of modules designed to provide an introduction to education for students who may not yet have decided to enter the teaching profession. A concurrent field experience is desirable, but it is not essential for the effective use of this module.

Module III-B: The Changing Adolescent

Goals:

1. To help students to understand the characteristics and values of today's adolescents.
2. To increase student awareness of the impact of juvenile crime of secondary schools.
3. To provide background information of the role of other youth-serving agencies in the community.

Rationale:

An introductory consideration of secondary schools must include an analysis of the lives of the clients--today's adolescents. This module leads students through an exploration of the characteristics, lifestyles, and values of the contemporary adolescent. Students will also investigate the work of various youth-serving agencies in the community and the interrelationships between those agencies and the secondary schools.

Activities:

Activities include committee investigations, class and small-group discussions, and individual reports. Most of the activities are open-ended and can easily be expanded, changed, or deleted to fit the requirements of a particular instructor.

Scheduling:

The module requires about five 50-minute class sessions. It is one of a number of modules designed to provide an introduction to education for students who may not yet have decided to enter the teaching profession.

Module III-C: Goals, Objectives, and Competencies

Goals:

1. To provide background information on goals that have been set for secondary schools.
2. To involve students in the process of setting goals for secondary schools.
3. To show students the need to translate goals into instructional objectives.
4. To help students understand the relationship between objectives, diagnosis, prescription, and evaluation in the instructional process.
5. To show students the advantages and disadvantages of minimum competencies in secondary schools.

Rationale:

A thoughtful introduction to secondary education must include a consideration of the goals of secondary schools--what they have been and what they should become. For would-be teachers, an understanding of the need to translate goals into instructional objectives is particularly important. And a discussion of goals and objectives would be incomplete today without exploring the concept of minimum competencies.

Activities:

Activities include class and small-group discussions, working through a programmed minitext on the systems approach to instruction, and taking a competencies-based "adult proficiency level" test.

Scheduling:

The module requires about five 50-minute class sessions. It is one of a number of modules designed to provide an introduction to education for students who may not yet have decided to enter the teaching profession.

Module III-D: New Directions for Secondary Schools

Goals:

1. To increase student awareness of recent recommendations by national study committees for improving secondary education.
2. To acquaint students with the concept of alternative education and its applications.
3. To acquaint students with the concept of action learning and its applications.
4. To involve students in consideration of some of the more widely publicized problems of secondary education.

Rationale:

A student considering entry into the teaching profession should be aware of the current trends in the profession and aware of proposals for change. He should also understand the implications those trends and proposals may have for his future as a teacher.

Activities:

Activities include committee investigations, class and small-group discussions, and individual reports. Most of the activities are open-ended and can easily be expanded, changed or deleted to fit the needs of a particular instructor.

Scheduling:

The module requires about nine 50-minute class sessions. It is one of a number of modules designed to provide an introduction to education for students who may not yet have decided to enter the teaching profession.

Module III-E: Preparing to Teach

Goals:

1. To make students aware of procedures that can be helpful in getting a teaching job.
2. To show students various tangible and intangible rewards of teaching.
3. To acquaint students with teachers' professional organizations and the benefits they can provide.
4. To provide students with information about job opportunities in education.
5. To involve students in identifying qualities that lead to successful teaching.

Rationale:

Before they get too deeply committed to the teaching profession, students should be made aware of the profession's advantages and its disadvantages. This is one of a number of modules that attempts to give students a rounded view of education.

Activities:

Activities include discussions, written reports, oral reports by members of the class, and discussions with guest speakers. Most of the activities are open-ended and can be changed to fit the needs of the instructor.

Scheduling:

The module requires about five 50-minute class sessions. It is one of a number of modules designed to provide an introduction to education for students who may not yet have decided to enter the teaching profession.

Module III-F: The Teacher at Work

Goals:

1. To introduce students to the services of a curriculum laboratory.
2. To acquaint students with the variety of classroom materials available to teachers.
3. To introduce students to the process of planning lessons.
4. To involve students in an exploration of the causes of "problem" behavior in the classroom and strategies for dealing with it effectively.
5. To acquaint students with the professional responsibilities teachers have in addition to their classroom duties.

Rationale:

This module introduces students to the four most persistent problems of teachers: finding suitable classroom materials, lesson planning, discipline, and the duties and responsibilities of teachers in addition to their classroom teaching. No introductory course can deal thoroughly with these topics; that is, in part, the responsibility of methods classes. Nevertheless, an introductory class would be remiss if it did not raise these crucial topics.

Activities:

Activities include class and small-group discussions, written assignments, oral reports by class members, and a tour of a curriculum laboratory. Most of the activities are open-ended and can easily be expanded, changed, or deleted to fit the needs of a particular instructor.

Scheduling:

The module requires about five 50-minute class sessions. It is one of a number of modules designed to provide an introduction to education for students who may not yet have decided to enter the teaching profession.

Module V-A: Individualizing Instruction

Goals:

1. To develop intern awareness of the rationale, techniques, and resources for individualized instruction.
2. To give interns practice in techniques to facilitate individualized learning.
3. To give interns an in-depth understanding of the strengths and weakness of one individualized secondary program.

Rationale:

A good teacher should have skills for individualized as well as [illegible] instruction, and should be able to make perceptive decisions about the selection of the self-paced versus group-paced curricula. Working with students in an individualized course will give interns a chance to know secondary school students as individuals. It will allow the practice of teaching skills, and it will provide an awareness of the pros and cons of individualized education programs.

Activities:

The intern works in a support role in a self-paced classroom and helps the students as they move through the individualized materials. Interns are expected to meet their assigned class each day and to keep a daily log that summarizes activities with students and that records personal reflections on the effectiveness of their teaching. Seminar activities provide background and support for the field experience.

Scheduling:

The module requires occasional seminar sessions throughout the semester and an associated field experience in an "individualized" classroom.

Module 4B: Developing a Self-Instructional Module

Goals:

1. To give interns an opportunity to design, produce, and evaluate a self-instructional module.
2. To increase intern familiarity with such elements of curriculum planning as performance objectives and evaluation.

Rationale:

Teachers often express dissatisfaction with curricula, but they do not always do all they can to imporve the curricula. The development of self-instructional modules is a good way to begin to modify the curriculum. The skills required to develop a good module are those required to develop any good unit of instruction, so this experience should help to promote a number of teaching skills.

Activities:

The intern and the cooperating teacher select a module topic that will be either remedial or an optional excursion from the basic course. The intern develops performance objectives, a list of prerequisite skills, a task analysis, pre- and posttests, and so forth. The intern will use evaluations by secondary school students, his cooperating teacher, and other interns in deciding what final revisions are necessary in his module.

Scheduling:

Five 50-minute seminars are described, but that much class time is not necessary for satisfactory use of the module. Extensive intern work outside class is necessary. The development of a self-instructional module should be regarded as a semester-project for the interns.

This module is meant to be used with an associated field experience, but it can be modified for use without the field experience if necessary.

Module V-C: Evaluating Teachers' Classroom Behaviors

Goals:

1. To enable teachers and teacher interns to understand the value of accurate, self-generated feedback in enhancing the quality of creative, effective teaching.
2. To develop skill in the use of the SATIC, an effective interaction assessment system for teachers.

Rationale:

All naturally occurring ecosystems include some form of feedback which helps in restoring and maintaining an optimal dynamic balance. In some ways the classroom is much like an ecosystem. In order to maintain dynamic balance in the classroom, each member of the system needs accurate, useable information about his performance and functioning in that system. Teachers, in particular, need information which enables them to take appropriate actions in changing and improving their own classroom behavior.

Activities:

This module provides an opportunity to learn a self-assessment system including information on:

1. the mechanics of using the SATIC system, audiotape recording as a feedback device, the coding of teaching behaviors, and the computation of various special behavioral indices;
2. the interpretation of an audiotape sample, the meaning and relationships of behavioral categories;
3. the methods of using the SATIC system to help change teaching behaviors;
4. aspects and implications of SATIC and self-assessment for teachers.

Scheduling:

The module contains materials through which interns can learn to code their own teaching behavior from an audiotape with reasonable reliability in under three hours outside the class. Suggestions are included for two one-hour class sessions. The module must be used with an associated field experience (practicum or student teaching). The system provides a particularly useful medium for self-assessment and supervision of student teachers. Cassette recorders and tapes are necessary.

Module V-D: Interpersonal Problems in the Classroom

Goals:

1. To focus interns' attention on the affective domain and help them to perceive students' feelings, desires, attitudes and values.
2. To help interns to develop techniques for constructive responses to students' feelings, desires, attitudes and values.

Rationale:

Learning to express and direct oneself is part of the process of growing up. To experiment with self-expression and self-direction, students need a classroom atmosphere of trust, respect, and openness. Self-expression, self-direction and learning in general are best facilitated when the teacher perceives and constructively responds to the students' desires and capabilities. When a teacher is able to offer understanding and empathy to his students, he should be able to deal more effectively with discipline problems, including some that have reached crisis stage. But the great advantage of having some practical knowledge of interpersonal relations is that the teacher may be able to solve or ameliorate such problems before they reach crisis stage.

Activities:

In role plays, the interns go through various student-teacher interactions; the interactions are discussed and alternative teacher strategies are suggested. The interns learn interpersonal skills, and the later sessions require the interns to integrate these skills in practice. The skills are carried over into the classroom by means of a "contract" the interns make with each other for improving some aspect of their classroom performance.

Scheduling:

Six to eight hours of class time are required. The module will be most effective is used in conjunction with a field experience, but it may be used without the field component.

It is recommended that module V-C, *Evaluating Teachers' Classroom Behaviors*, be used concurrently.

Module V-E: Mastering the Human Relations Skills

Goals:

1. To provide an overview of the human relations skills.
2. To provide a rationale for their use.
3. To show how the skills can be effectively employed to improve interpersonal communications.
4. To provide training in:
   a) attending behaviors,
   b) paraphrasing,
   c) tagging of feelings,
   d) perception checks,
   e) empathy,
   f) genuineness,
   g) confrontation,
   h) contracting.
5. To give interns feedback for their use of the skills.

Rationale:

Teaching is basically a profession of interpersonal helping. The successful teacher, if not specifically trained in human relations, generally possesses at least an instinctive familiarity with the basic human relations skills. But not all teachers have such an instinct--and even for those who do, specific training in the skills can have beneficial results for both the teacher and his students.

Activities:

For each of the skills, the module contains readings, in-class structured activities, and exercises for practicing the skills with students in the intern's practicum setting. The emphasis throughout is on using the skills in real-life situations.

Scheduling:

The module consists of eight two-hour seminars. It is meant to be used in conjunction with a practicum in the intern's junior year. The module can be used without the practicum, but it will not be as effective that way.

Module V-P: Facilitating Classroom Interactions Through Transactional Analysis

Goals:

1. To develop an awareness of realities in the interpersonal and professional relationships in teaching.
2. To provide meaningful simulation and discussion of problematic classroom, school, and community interactions.
3. To introduce Transactional Analysis (TA) and its applications.
4. To help teacher interns develop a rational problem-solving system for classroom, school, and community interactions.

Rationale:

The political and interpersonal realities of the school community are often puzzling for new teachers and they are too often neglected in teacher education. This module provides a way to recognize potential difficulties and a workable system of analysis, and developing response strategies for those difficulties.

Activities:

The seminar sessions consist primarily of simulations, role plays, and discussions which lead to a conceptual and experiential understanding of the TA ego states and other related information.

Scheduling:

This module comprises four one-hour seminar sessions. A concurrent field experience is desirable, but not essential.

Module V-G: Using Case Studies to Understand Students

Goals:

1. To increase interns' sensitivity towards students.
2. To help interns to understand the implications of student characteristics for teaching and learning.

Rationale:

Learning is dependent on students' interests, skills, and aptitudes, and teaching can be more effective if the teacher is aware of the specific interests, skills, and aptitudes of his students. The development of case studies should help interns to go beyond superficial observations and, in studying a few students in detail, to increase their understanding of students in general.

Activities:

The interns observe a few selected students in the classroom; they work with them, talk with them, and get enough background information to develop a detailed perception of the students' special characteristics. The seminars help to focus attention on relevant student characteristics and on techniques for acquiring information. Implications of the student characteristics for teaching are discussed in seminar.

Scheduling:

Two or three 50-minute class sessions and an associated field experience (or access to students in a classroom) are required. Concurrent use of module V-H, *Assessing Students' Intellectual Development*, is recommended.

Module V-H: Assessing Students' Intellectual Development

Goals:

1. To provide an awareness of differences in perception and cognitive abilities among students.
2. To introduce some of the characteristics of concrete and formal levels of development.
3. To explore the implications of intellectual development for teaching and curricula.

Rationale:

There are large differences in the cognitive abilities of students and in their abilities to process logical thought. Such differences have implications for teaching and for the selection of curriculum materials, and these implications must be explored. In this module, interns have the opportunity to examine intellectual differences through interviews and through the administration of Piagetian tasks.

Activities:

The module begins with an introduction to intellectual development and to the administration of Piaget-type tasks. The interns administer such tasks to secondary school students to gain a firsthand awareness of differences in cognitive skills. The module concludes with an examination of relevant cognitive data, further study of intellectual development, and a review of the implications of intellectual development for teaching.

Scheduling:

Two or three class sessions are required, plus time for the administration of tasks to students in the field. An associated field experience or access to secondary school students for the administration of tasks is essential.

Module V-K: Teaching Science as Inquiry

Goals:

1. To show interns how to teach science as inquiry.
2. To show interns how to use inquiry techniques in the teaching of science.
3. To provide teaching experience with inquiry laboratory activities and with "inquiry into inquiry."
4. To provide an overview of inquiry resource materials.

Rationale:

Modern secondary science teachers should be competent in the use of inquiry teaching strategies. When teaching is limited to didactic instruction, there is insufficient opportunity for students to develop attitudes of inquiry and to experience some of the processes of scientific thinking that are among the broad goals of science teaching. Students need to be encouraged to think for themselves, to hypothesize, to test their hypotheses, to develop ideas, to gather data, to improve understanding.

Activities:

In this module interns explore the rationale and strategies for inquiry teaching and they plan, teach, and evaluate inquiry activities. The interns also select a conventional, published laboratory activity and modify it from didactic to inquiry form. The new inquiry lab activity is used by students and evaluated. This module includes a review of resources from which appropriate inquiry teaching activities may be developed.

Scheduling:

The module will involve five to seven 1½-hour sessions. It has been prepared for use with an associated field experience with secondary school students, but it may be used without the field component if appropriate arrangemems cannot be made.

Module VI-E: Evaluating Student Learning and Attitudes

Goals:

1. To provide an overview of the purposes, potential, and limitations of evaluation.
2. To teach interns basic concepts of evaluation and to give them a chance to apply the concepts.
3. To provide experience in the analysis, design, and use of non-paper-and-pencil tests.
4. To provide experience in the analysis, design, and use of attitude inventories.
5. To provide experience in the analysis and design of evaluation procedures, including grading and reporting.

Rationale:

Evaluation is a necessary part of the teacher's duties, but it should be more than just a duty; it should be an integral and supportive part of instruction. The activities in this module are designed to accomplish that end.

Activities:

An earlier module on evaluation (module IV-C: *Introduction to Student Evaluation*) dealt primarily with paper-and-pencil achievement tests; this module emphasizes other measures which, in spite of their importance, are not widely used by science teachers. Interns learn basic concepts related to testing and evaluation and they deal with grading and reporting of test results. Throughout the module a variety of measures and techniques are employed to involve the interns in experiences (such as use of the concept inventory) providing a "hidden curriculum" which is congruent with and supportive of the overt curriculum.

Interns begin by discussing the goals and objectives of evaluation, the difference between measurement and evaluation, and the means by which evaluation can become an integral part of instruction. They respond to an evaluation concept inventory which contains close to 100 concepts and terms related to evaluation. This instrument is an example of a motivating, organizing, and self-evaluation device; similar inventories may be used later by interns in their classes. Interns devise examples on non-paper-and-pencil tests and perform a practical laboratory test. They also respond to an inventory measuring attitudes toward inquiry teaching and become familiar with several forms of attitude inventories. Where feasible, they administer non-paper-and-pencil tests and attitude inventories to students and analyze the results. They deal with grading and other ways of giving students feedback and reporting to parents. Finally, they consolidate what they have learned by discussing classroom incidents related to evaluation and by post-testing themselves with the same concept inventory that was used as a pretest.

Scheduling:

The module requires five 90-minute sessions. Module IV-C or a similar introduction to evaluation should be a prerequisite.

Module VI-F) Teaching Laboratory Science

Goals:

1. To show interns the role, the potential, and the limitations of the laboratory as a teaching device.
2. To help interns develop laboratory teaching skills.
3. To help interns develop positive attitudes toward laboratory experiences and laboratory teaching.

Rationale:

The laboratory is a distinct learning environment highly related to scientific inquiry and possessing unique advantages for learning science. In recent years most educators have recognized the value and potential of activity based learning in all areas. The science laboratory offers endless opportunities for the development of a variety of intellectual, inquiry, manipulative and inter-personal skills. In many institutions, including those which train teachers, the science laboratory has not been adequately utilized. If interns use their own laboratory experiences as models, their utilization of the laboratory when they become teachers can be as inadquate as their past experiences. This module will demonstrate how valuable laboratory work can be when properly planned and adequately utilized.

Activities:

The seminars include individual and small group activities. Assignments include reading, reporting, self-learning laboratory activities, field experiences, and planning and analysis of laboratory activities.

Scheduling:

The module requires six 90-minute sessions. No field experience is required.

Module VI-G: Developing Science Laboratory Skills

Goal:

To help teachers acquire competencies in a variety of science laboratory skills specific to their own academic areas.

Rationale:

Science teachers should be competent in a variety of basic laboratory skills in their academic areas, not only for safety reasons, but so that laboratory activities can be done efficiently and effectively. The skills include the use and repair of laboratory equipment as well as the ability to perform chemical and biological techniques.

Activities:

The teacher intern, in self-instructional activities, acquires and demonstrates selected laboratory skills beneficial to effective laboratory teaching. These skills include: preparing standard solutions, glass working, care of plants and animals, maintaining aquaria and terraria, and using and maintaining laboratory equipment.

Module VI-H: Increasing Laboratory Safety

Goals:

1. To show teachers how to make laboratories and field trips safe.
2. To give teachers an adequate knowledge of safety procedures.
3. To give teachers the necessary skills for checking laboratory safety and correcting potential hazards.

Rationale:

The safety of students is a prime responsibility of every teacher, and teachers should be familiar with safety procedures. Since laboratory work is an integral and essential part of science courses, teachers should be able to make the laboratory a safe place in which students can work. Teachers should also be familiar with state laws regarding safety in the laboratory and on field trips and with the liabilities incurred with unsafe practices. The discussion of liability should not discourage the use of the laboratory and field trips, but it should encourage proper planning and procedures for these activities.

Activities:

The teacher intern runs a safety check in a college or secondary school science laboratory, notes violations of good safety procedures, and makes recommendations for correction of violations. As an option, the teacher intern can observe a segment of a laboratory activity in progress, note student and teacher behaviors that indicate knowledge or lack of knowledge of good safety practices. The intern reads about state laws that are relevant to laboratory safety and about teacher liability for inattentiveness to safety in the laboratory and on field trips. The intern analyses two case studies in teacher liability and suggests procedures that would enable appropriate activities to proceed so that liability is not incurred.

Scheduling:

The module requires two or three 50-minute class sessions sometime in the third or fourth year of the teacher education sequence.

Module VIII-A: Initiating Successful Student Teaching

Goals:

1. To make professionally sound, personally compatible placements for student teaching.
2. To initiate effective relationships between student teachers, cooperating teachers, university supervisors, and school district and university staffs.
3. To lead interns to an understanding of cooperating teachers' and university supervisors' expectations.
4. To help interns discover the structure, functions, and resources of the cooperating school's staff and facilities.
5. To lead interns to an awareness of their cooperating teacher's routines and teaching strategies and of the attributes and needs of the students.
6. To help interns develop goals for student teaching.

Rationale:

Student teaching involves interactions of people, places, and materials, and these interactions can not always be expected to go smoothly. Therefore it is essential that these interactions be adequately considered during the period of placement for student teaching. This module helps with school placement and helps to initiate a positive atmosphere for student teaching.

Activities:

The activities include conferences among university supervisors, student teachers, school district staff, and cooperating teachers; informal social gatherings; seminars; school visits; and classroom observations.

Scheduling:

The module is designed to precede an extended student teaching experience. The activities begin about halfway into the semester before student teaching and extend into the student teaching semester. There are only two seminars included; they take place in the first couple of weeks of the student teaching semester.

Module VIII-B: Growth in the Teaching Process

Goals:

1. To facilitate the teaching goals of Module VIII-A.
2. To identify the student behaviors and the teaching behaviors implied by the teaching goals.
3. To assess teaching behaviors and to improve and develop selected behaviors.
4. To develop and employ a sensitive evaluation system compatible with the teaching goals and with the constraints of the school and the cooperating teacher.
5. To develop and employ a workable system for classroom management compatible with the teaching goals.
6. To develop an intern awareness of the variety of science curricula and instruction being used in the cooperating schools.

Rationale:

Good teaching does not heppen by accident. It can be developed if teachers assess what they are doing from time to time and if they objectively examine the implications of their own behavior. A good teacher develops and grows in response to his interactions with students and others in the learning environment. The activities in this module are designed to help such development and growth.

Activities:

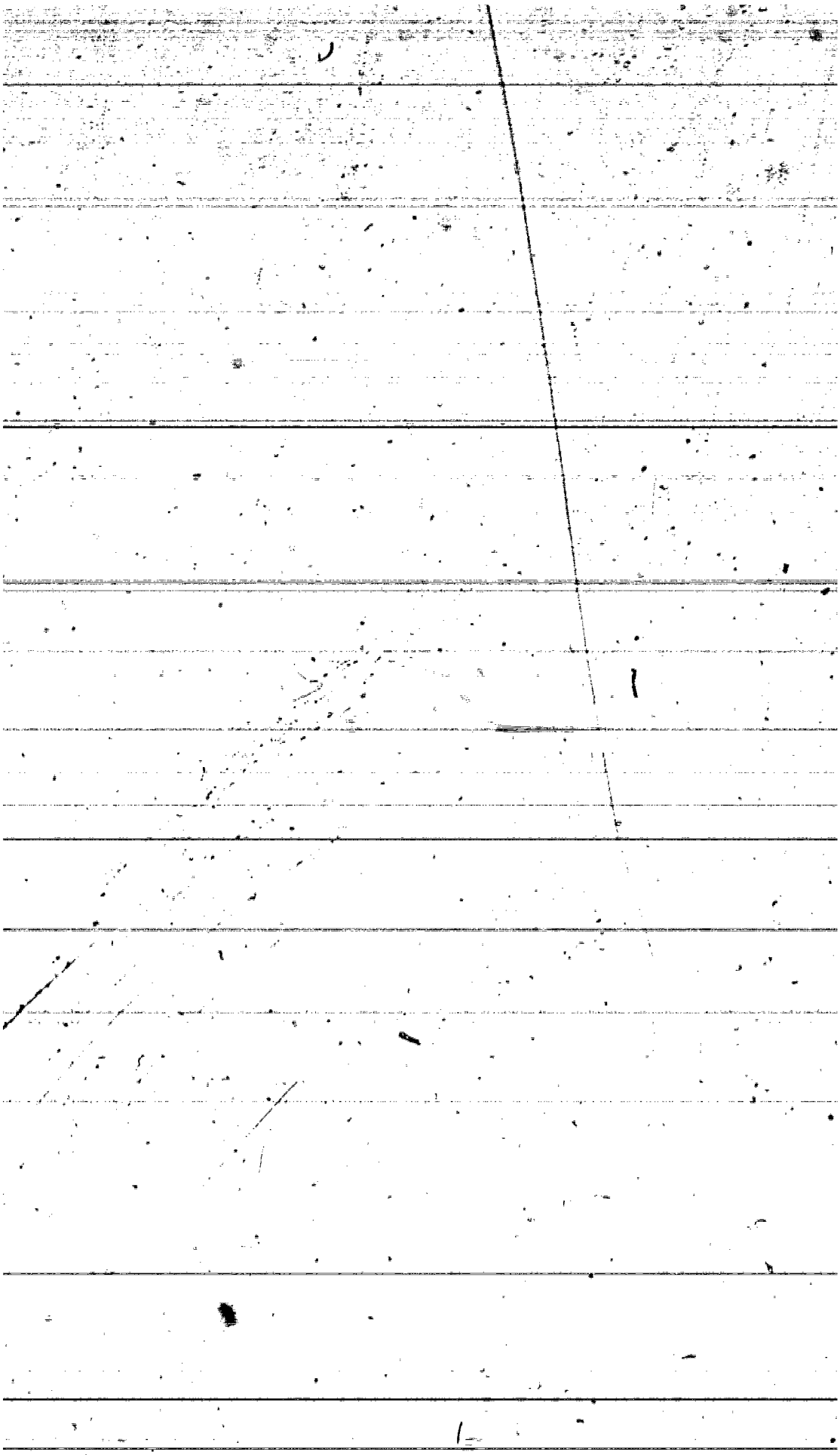
The primary activities support classroom teaching and occur in the classroom. Interns prepare lesson plans, specifying performance goals that are consistent with the teaching goals already developed, and use them in their teaching. At the end of each day they annotate the lesson plans, assess the degree to which their goals have been attained, and describe changes they would make in a second round of teaching.

Students behaviors and teaching behaviors implicit in the teaching goals are developed in seminar activities. The interns assess their own teaching behavior by making and analyzing audio- and videotapes. They develop a contract to change ineffective teaching behavior and they monitor their behavior change. Some activities also deal with evaluation and classroom management; each intern develops systems that are compatible with his teaching goals and with the constraints of his school and his cooperating teacher.

Scheduling:

This module provides activities that run for most of the duration of the student teaching experience. Besides the time spent in classroom teaching and preparation, interns will have to attend one 1½-hour seminar every week.

Completion of Module VIII-A is a prerequisite.



Module VIII-C: Student Teaching and Beyond

Goals:

1. To evaluate the student teaching experience.
2. To compare the accomplishments of the student teaching experience with the teaching goals defined in Module VIII-A.
3. To develop a new and better list of teaching goals.
4. To describe how personal teaching behavior should be modified and developed for future teaching.

Rationale:

Evaluation is the first step towards improvement. This module places the student teaching experience in perspective and encourages the intern to look to the future.

Activities:

Interns evaluate the student teaching experience and compare their accomplishments with the teaching goals defined at the beginning of the semester. Differences between hopes and reality are examined. Were the goals unrealistic? How should they be modified? Each intern develops a new set of goals for a new round of teaching in his own classroom and describes how he would modify and develop his teaching behavior in his own classroom. He prepares a position statement on his teaching values and style.

Scheduling:

This module is designed to conclude an extended student teaching experience. Activities will take place outside of class and in one or two 1½-hour seminars.

Module VIII-D: Humanizing the Science Classroom

Goals:

1. To develop criteria for pleasant and attractive science laboratories and classrooms.
2. To use such criteria to suggest possible improvements in laboratories and classrooms.
3. To plan and carry out a project to improve a laboratory or classroom.
4. To determine the effect of the teacher's personality and actions on the learning environment.
5. To determine the effect of the learning environment on students' attitudes towards the study of science.

Rationale:

Science classrooms and laboratories often are either too cold and sterile or else too cluttered and unorganized. Either of these extremes may lead the students to develop negative attitudes towards the study of science. This module has been designed to help interns to "humanize" classroom environments while stressing the importance of the teachers in maintaining such environments.

Activities:

The interns carry out projects to humanize the science classroom/laboratory environment in the schools in which they are teaching, and they determine what effects teachers have on the classroom environment. They evaluate the effects of their improvement projects or the effects of teachers' personalities and actions on students' achievement and attitude. In the introductory sections, interns develop criteria for humanizing the science classroom or laboratory.

Scheduling:

The module covers five 50-minute class sessions. It should be used in conjunction with a field experience. Alternatively, it can be used as part of an inservice education project.

Module VIII-F: Get[illegible]aching Job

Goals:

1. To investigate educational placement procedures.
2. To register with an educational placement office.
3. To develop techniques for communicating with potential employers.
4. To develop skills for employment interviews.

Rationale:

Because there are now considerably more qualified teachers than there are teaching positions, employers can be more selective than they used to be. Therefore it is important for students to know how to look for a job and how to sell themselves to a prospective employer.

A continuing record of professional experience, such as is kept by a placement service, facilitates gaining new positions. Special skills are necessary for assembling such a record. Other skills are needed for writing, for telephoning, and for other types of contacts with potential employers. The personal interview is the most important type of contact, and as such it deserves special attention.

Activities:

The seminar activities include a number of exercises in communication skills, such as writing letters, telephoning, and interviewing techniques. Interns register with an educational placement office, and each intern participates in a mock interview.

Discussions with first-year teachers, school administrators and educational placement personnel offer alternative views of the problem of getting a job.

Scheduling:

This module is designed for a seminar that accompanies the intern's final student-teaching experience. It is assumed that some of the activities in the module will be completed before the last semester of the final year of the intern's program.

Module VIII-H: Growing Professionally in Education

Goals:

1. To become familiar with special professional organizations and programs.
2. To participate in professional meetings and special activities including firsthand experience with inservice teachers.
3. To use information from a variety of professional journals.
4. To investigate the philosophies and programs of teacher organizations.

Rationale:

The competent teacher finds ways to remain dynamic and professionally alive even in the midst of institutional lethargy. This module introduces preservice teachers to professional organizations and activities that should facilitate understanding and help to initiate continuing professional growth. The module gives preservice teachers firsthand experiences with professional organizations, their meetings, and their journals.

Activities:

Interns explore means for professional growth through a variety of activities. Individual readings and activities within the intern's academic field provide a background for interdisciplinary class discussions, panels, and role-playing activities.

Optional activities include interviews with inservice teachers about professional organizations, bargaining and inservice activities; participation in professional meetings and inservice activities; and a critical review of professional journals in the intern's major field. Interns will have the opportunity to talk with representatives of educational associations or with people planning to present papers or lead activities at professional meetings. Interns may also choose to prepare a manuscript for publication in a professional journal, to develop and run an inservice activity, or to plan a program for presentation at a professional meeting.

Scheduling:

This module has been prepared for use in a seminar for student teachers, but it can also be used in a methods course before the interns begin student teaching. It can be used over a long period of time since many of the activities are long-range ones.

A concurrent field experience is not required.

Module IX-A: Teaching the Nature of Science

Goals:

1. To familiarize interns with conceptions of philosophers of science about the nature of science.
2. To show the meaning of the historical approach and to provide experiences related to its incorporation into science courses.
3. To familiarize interns with basic concepts and processes for the development of scientific knowledge.
4. To show interns how to use social and moral issues in the teaching of science.
5. To give interns an understanding of the structure of human knowledge in general and of science in particular.
6. To identify the image of science embedded in particular curricula.
7. To show the difference between science as inquiry and science as a rhetoric of conclusions.
8. To acquaint interns with instruments to measure attitudes towards, and understanding of, science and scientists.

Rationale:

Knowledge and understanding of the nature of science is a central aim of all the new science curricula of the 1960s and 1970s. So far research shows that a number of potentially effective variables have not been successful in enhancing a higher level of understanding of science. These unfruitful variables include: teaching strategies in the classroom and the laboratory (inductive, open-ended, inquiry, and guided discovery), teacher characteristics (professional training, knowledge of the subject, commitment to a given philosophy, classroom climate and teaching style), and curricula. However, experimental courses in which learning about science and scientists was made explicit ("Science and Culture," "History of Science Cases"), significantly increased the students' knowledge and understanding of science. It follows that as far as this important aim is concerned, one cannot count on incidental learning. Specific and explicit efforts by teachers as well as designers of curricula are needed.

The purpose of this module is to acquaint prospective teachers with issues and problems related to this aim. It is realized that a module of this scope is by no means a substitute for courses in the history and philosophy of science. Nevertheless, the module does provide a selection of valuable experiences. For those who have not taken a course in the history and philosophy of science, it opens the gate to a new realm. For those who are knowledgeable in the area, it provides an integration of ideas and practical applications which are often missing in regular history and philosophy of science courses. This module should be looked upon as a beginning, a foundation on which prospective teachers can build in the course of their professional development.

Activities:

Interns begin by considering a new proposed science, umbrellaology. Through this stimulating experience they come to examine the question: What is science? They read a paper by Medawar, "Is the Scientific Paper a Fraud?," and examine and analyze a scientific paper in terms of Medawar's ideas. By these experiences they tackle the notion of The Scientific Method and find how limited and unrealistic it is. The historical approach is then introduced as a way of providing realistic image of science, scientists and the growth of scientific knowledge. Interns examine curricular materials which follow this approach and try to design their own units and teach them. Additional reading and discussions bring out the role of models and theories in science and the issues involved in their teaching to high school students. Again actual planning and teaching follow the theoretical discussions. New trends in science teaching emphasizing social issues are brought in and the problems of incorporating social issues into science courses are dealt with. The nature and importance of the structure of knowledge, the disciplines in general and science in particular are discussed and illustrated in order to provide a sound basis for making decisions related to disciplinary versus integrated courses and their implications. The importance of adhering to the notion of science as inquiry as the core of any science course is realized through a series of analyses of teachers' guides and student materials. The module ends with an activity designed to acquaint the interns with instruments that measure knowledge and understanding of, and attitudes towards, science.

Scheduling:

The module involves six 1½-hour sessions and an optional follow-up meeting. It has been prepared to use with associated field experiences with secondary school students, but it may be used without the field component if appropriate arrangements cannot be made.

Module X-B: Facilitating School-Community Relationships

Goals:

1. To understand the rationale and problems associated with school-community relationships.
2. To provide the teacher with an opportunity to outline resources and goals associated with school-community projects.
3. To examine difficulties associated with teacher-parent communication.
4. To demonstrate the process of consensus decision-making in group activities.
5. To plan activities leading to the development of school-community projects.
6. To design strategies for achieving school-community goals.
7. To evaluate the success of school-community projects.

Rationale:

As well as being competent in making use of available community resources in their school programs, teachers should be willing and able to contribute to projects involving the community at large. They should understand the needs of the community and work in harmony with others in satisfying these needs. At the school level, they should actively seek cooperation from parents and other resource personnel in developing programs relevant to the needs of their students.

Activities:

In this module teachers explore the rationale and strategies for encouraging close cooperation between schools and the community. They are alerted to the range of resources available to both the school and the community and consider a number of objectives that might guide cooperative projects. Opportunities are made available for teachers to consider difficulties in communicating with members of the community, particularly parents. Some necessary skills for working in groups are developed with emphasis on consensus decision-making. The module concludes by giving interns an opportunity to design porgrams and activities for community participation.

Scheduling:

The module contains five 1½-hour sessions, which can be used together or as individual units. The module can readily be used in association with field experiences with teachers and members of the community, but can also be used without the field component if appropriate arrangements cannot be made. All sections are suitable for inservice activities with practicing teachers. Some sections might be used effectively with other modules. For example, Section 4 on consensus decision-making could be used whenever it is desirable to develop skills for small-group activities.

G. Teacher Education Centers Using Iowa-UPSTEP Modules

Distribution List

(Update: 1980)

Dr. Lloyd Barrows
University of Maine at Orono
Orono, Maine

Dr. Benjamin E. Bandiola
Union College
Lincoln, Nebraska

Dr. Charles Barman
University of Wisconsin
Superior, Wisconsin

Dr. Herbert Brunkhorst
Coe College
Cedar Rapids, Iowa

Dr. Betty M. Burchett
University of Missouri
Columbia, Missouri

Dr. Eugene L. Chiappetta
University of Houston
Houston, Texas

Dr. Robert E. Cook
Southeast Missouri State College
Cape Girardeau, Missouri

Dr. Andrew W. Darton, Jr.
University of Missouri
Kansas City, Missouri

Dr. Carl Eisemann
Knox College
Galesburg, Illinois

Dr. Donald Hamilton
Western Illinois University
Macomb, Illinois

Benjamin G. Henry
Murdock Teacher Center
Wichita, Kansas

Dr. Allen Herrboldt
Westmar College
LeMars, Iowa

Dr. Maxine S. Jackson
Wisconsin State University
LaCrosse, Wisconsin

Dr. Robert K. James
Kansas State University
Manhattan, Kansas

Dr. William G. Lamb
Delta State University
Cleveland, Mississippi

Dr. William LaShier
University of Kansas
Lawrence, Kansas

Vincent N. Lunetta
University of Iowa

Dr. LaMonte Lauridsen
Baker University
Baldwin City, Kansas

Dr. J. Benjamin Leake
University of Missouri
Columbia, Missouri

Dr. Vincent D. Mahoney
Iowa Wesleyan College
Mt. Pleasant, Iowa

Dr. Donald McCurdy
University of Nebraska
Lincoln, Nebraska

Mr. John M. Nickel
Wichita State University
Wichita, Kansas

Dr. James Okey
University of Georgia
Athen, Georgia

Dr. Paul Otto
University of South Dakota
Vermillion, South Dakota

Mr. Phil Randol
Murdock Teacher Center
Wichita, Kansas

Dr. Donna L. Siemro
Governors State University
Park Forest South, Illinois

Dr. Leopold E. Smigelski
Millikin University
Decatur, Illinois

Dr. Robert Snavely
Loyola University
Chicago, Illinois

Dr. Alan M. Voelker
Northern Illinois University
DeKalb, Illinois

Dr. Russell Yeany
University of Georgia
Athens, Georgia

Dr. Leon J. Zalewski
Governors State University
Park Forest South, Illinois

Bill Sharp
Jamestown Public Schools
Jamestown, New York

Dr. Donald C. McGuire
National Science Foundation

Dr. Tony Heiting
Iowa Energy Policy Council
Des Moines, Iowa

Jerry Krockover
Purdue University
West Lafayette, Indiana

John E. Penick
University of Iowa

Dr. Ronald Simpson
North Carolina State
Raleigh, North Carolina

Dr. William Capie
University of Georgia
Athens, Georgia

Dr. Herb Cohen
Arizona State University
Tempe, Arizona

Robert Hardingham
Kelvin Grove College
Brisbane, Queensland
Australia

Massood Ashrafi
Bu-Sina University
Iran

Dr. Michael J. Wavering
Model Laboratory School
Eastern Kentucky University
Richmond, Kentucky

Dr. Dale Jensen
Northern Trails AEA
Clear Lake, Iowa

Philip Horton
Florida Institute of Technology
Melbourne, Florida

A. O. Jackson
UNM Bookstore
Albuquerque, New Mexico

Department of Education
St. Ambrose College
Davenport, Iowa

Department of Education
Indiana University
Bloomington, Indiana

Dr. M. F. Thomaz
University of Aveiro
Aveiro, Portugal

Department of Education
University of Maine at Orono
Orono, Maine

Cowles Library
Drake University
Des Moines, Iowa

Central Stores
University of Akron
Akron, Ohio

Dr. Chris Bigum
Melbourne State College
Melbourne, Australia

Dr. Pamela M. Balch
West Virginia Wesleyan College
Buckhannon, West Virginia

Mr. James M. Langford
3802 Del Sienno
Wichita, Kansas 67203

Dr. W. D. Samiroden
Department of Secondary Education
Faculty of Education
University of Alberta
338 Education South
Edmonton, Alberta
CANADA T6G 2G5

Kenneth D. Moore
Department of Education
Box 2758
University of Science & Arts of Oklahoma
Chichkasha, Oklahoma 73018

Paul Bisgard
Principal
Nashua Elementary School
Nashua, Iowa 50658

Project RISE
Interdistric Committee
Halls Hill Road
Colchester, Connecticut 06415

Department of Curriculum Studies
Education Building
Room 3025
University of Saskatchewan
Saskatoon, Saskatchewan
CANADA S7N OWO

G. Gennaro
Curriculum and Instruction
148 Peik Hall
159 Pillsbury Drive, S. E.
Minneapolis, Minnesota 55455

Mr. Roger Spratt
Science Coordinator
Ames Community School District
120 S. Kellogg
Ames, Iowa 50010

Dr. Laverne Thelen
101-A School of Education
University of Massachusetts
Amherst, Massachusetts 01003

Dr. Gordon Senoff
Science Education
Faculty of Education
Brandon University
Brandon, Manitoba
CANADA R7A 6A9

Dr. Paul Blisenherz
Curriculum and Instruction
University of New Orleans
New Orleans, Louisiana 70122

Department of Education
Radford University
Radford, Virginia 24142

Patricia Lucido
Horace Mann Learning Center
Northwest Missouri State University
Maryville, Missouri 64468

III. Iowa-UPSTEP Program Evaluation

A. The Evaluation Efforts in General

The set of conditions that initially stimulated the need for Iowa-UPSTEP in 1969 has changed many times in the ten years of development and operation. Although the demand for science teachers changed during the decade, some characteristics remain; namely, 1) the problems related to teacher education programs embedded in a large academic institution in which early identification of potential students is difficult; 2) number of science education students is small; 3) institutionally, undergraduate teacher education has a relatively low priority; 4) the reward system encourages activities other than teacher education program development, implementation, and evaluation; and 5) enrollment in public school science is decreasing and shifting toward junior high school. In such a milieu, Iowa-UPSTEP has attempted to develop a program model which reflects a variety of external influences and delineates the roles of the players involved.

It was obvious early in the development of Iowa-UPSTEP that the model required a dynamic aspect which would reflect the changing needs of teacher education as well as the futuristic demands of American education. Jensen (1971) found that the traditional program at Iowa lacked 1) integration between courses in the program, 2) concern with the real world--the public school classroom, and 3) contemporary ideas and materials, i.e., new curricula and progressive approaches. Golmon (1971) explored methods courses and student teaching at the University of Iowa prior to the development of UPSTEP and found that preservice experiences affect student attitudes, philosophies, and self-concept. Pizzini (1973) found that UPSTEP students' self-concept and attitude toward science improved considerably more than a similar group of non-UPSTEP students. Phillips (1976) found that after the first freshman clinical experience, UPSTEP students

were more humanistic than other elementary or secondary students after a similar experience.

Since 1975, systematic collection of data from various aspects of the UPSTEP program has been underway. These data, on students and cooperating teachers, include profiles of UPSTEP students, attitude surveys of enrolled students, the Multidimensional Assessment of Philosophy of Education (MAPE), follow-up surveys of past graduates, audio-tapes, video tapes, classroom visits with past graduates, and biographical information on cooperating teachers. Each of these will be dealt with in separate sections of this report.

With all of these data, it must be remembered that Iowa-UPSTEP is an evolving program which produced its first graduates in May, 1975.

Since rapid program evolution continued through 1976, the graduates of 1980 should more clearly reflect the success of the UPSTEP program.

The Biographical Form for Cooperating Teachers (Appendix 3) is distributed to all elementary and secondary cooperating teachers who contribute to the UPSTEP program. This provides information which aids in successfully matching student teachers to the special interests and experiences of the cooperating teachers.

In an effective teacher education program prospective teachers must be provided with the knowledge, expertise, and experience necessary for becoming a successful teacher. Cooperating teachers are essential to the UPSTEP program, and proper communications are essential to achieve the goals of the program. Optimum communication is necessarily based upon understanding, and the data collected here will help to promote that understanding.

As is apparent from Table 1, the UPSTEP cooperating teachers are mature, well-educated, and represent a variety of experiences. No specific cognitive or philosophical data have as yet been collected from cooperating teachers.

TABLE 1

SUMMARY DATA FOR

UPSTEP COOPERATING TEACHERS

	Elementary Teachers (N=12)	Secondary Teachers (N=31)
Average Age	34.7	39.7
Highest Degree		
Bachelors	5	4
Masters	7	27
Average Teaching Experience	10 yrs.	15 yrs.
Percent with experience in:		
Elementary	100	6
Junior High	14	61
High School	14	89
Average Semester Hours Completed in:		
Education	54.2	46.8
Life Science	16.0	44.7
Earth Science	5.7	16.8
Chemistry	3.2	18.8
Physics	1.2	13.2

The Multidimensional Assessment of Philosophy of Education (MAPE) (Guertin, 1973) has been administered to students at the beginning of the freshman clincal experience since the Fall, 1975 semester. The MAPE instrument was administered to this particular class of students in order to provide them with early feedback regarding their philosophies of education. Beginning with the Fall, 1976 semester, MAPE has also been administered at the end of the student teaching. Ideally, this provides students the opportunity to compare their scores on the MAPE sub-scales and assess for themselves changes which have occurred.

MAPE supplies scores on six sub-scales representing major dimensions of a person's teaching philosophy. These sub-scales are:

1. CLASSROOM CLIMATE

   Unstructured (high score)

   Dedicated to flexible and personalized management of the classroom. Liberal in view of what should go on in the classroom. Instead of regimenting a class by improving rules and curriculum procedures, personal skills are employed to maximize pupil expression.

   Controlling (low score)

   Controlling and punitive in managing the classroom. Views on discipline are conservative. Instead of taking into consideration special circumstances, justice prevails as demanded by a commitment to rules.

2. INDIVIDUAL DIFFERENCES

   Acknowledge (high score)

   Full recognition of the individual underlies decisions about people and interaction with them. Liberal in accepting people's unique characteristics and letting those enter expectancies for them. The nature of the individual should establish what is right for him rather than depending upon conventional expectations.

Ignores (low score)

People are expected to come up to fixed standards of excellence. Pressure should be kept on pupils to reach minimum standards rather than let them set their own goals of competence.

3. TEACHING STYLE

Personal (high score)

Dedicated to personalized teaching. Liberal view of education with the teacher as the essential ingredient. Opposed to tutorial materials that relegate the teacher to secondary importance. Rejecting of mechanical techniques.

Impersonal (low score)

Conservative view of education as acquisition of knowledge. Emphasis on learning the three R's. Pupils should be constantly confronted with subject content rather than provided with interesting diversions.

4. LEARNING EMPHASIS

Social (high score)

Course content is regarded as useless unless it has social relevance. A liberal perception of education as the process of pupils exploring their own interests. General curriculum procedures and textbooks are viewed with suspicion because they reduce the pursuit of interests and eliminate interaction of pupils.

Textbook (low score)

Conservative view of education as accumulation of numerous facts. Class time is too valuable to spend on having fun or playing social games. The pupil must be bombarded constantly with facts. Textbooks are all important and the printed word is revered.

5. PROCEDURES AND PLANNING

Utilizes (high score)

Utilizes planning and special procedures as much as possible. Generally supportive of the educational enterprises. Belief that careful preparation and objective procedures are essential for the educational process. Dependent upon structure and benchmarks. Ready acceptance of procedures worked out by others.

Distrusts (low score)

Distrust and reject special educational procedures and planning. Instead of depending upon detailed lesson plans and standardized tests, interpersonal skills should be employed to assess and teach according to the teacher's wishes. Such procedures are regarded as intrusions into the teacher's domain.

6. THEORETICAL BASE

Idealistic (high score)

Emphasis on ideals and unrealistic goals. Idealistic principles often impractical but they are adhered to. Principled and self-sacrificing when necessary. Intolerant of those who pursue selfish goals.

Pragmatic (low score)

A pragmatic approach to life leads to viewing the educational establishment critically. Rather than depending upon cherished beliefs and pet theories of others, there is a clear need to do things his own way. Aware of personal opportunities and ready to do what is necessary to be successful. Administrators and test constructors with behind-the-scenes experience have more reason to be critical of even the very procedures they employ and may score low.

Norms are given which indicate how far each student's scores deviate from the average, but no judgment is implied that the average position is desirable. The authors of MAPE expect teachers and preservice teachers to show individual differences. They are, therefore, not expected to be average in each category.

Each individual student receives a printed output which consists of a profile of percentile scores and a row of corresponding standard scores. Students also receive a statement regarding validity and a computer generated narrative which is printed out according to the information provided by the six sub-scale scores.

The information obtained from the MAPE instrument has provided students with very important and essential information regarding their educational philosophies. It has proven to be beneficial for students encountering their first

field experience in education to be provided such information, so that they can evaluate their performance in the classroom as early as is possible. Methods students have been provided with a means of measuring attitudinal changes--something which they often find difficult to assess for themselves. MAPE results seem to reinforce their awareness of the changes which have occurred.

Results of the MAPE scoring (Figure 5) indicate that students entering the freshman program have mean scores not appreciable different from students a year later in the second methods course. The range of responses is of importance, though. The beginning students show a wide variety of responses while methods students are more clustered in their beliefs on most of the scales. Personal teaching style scores indicate methods students are also much more aware themselves in the classroom and are less concerned with the acquisition of knowledge than are the freshman students. An interesting difference occurs in the social-textbook learning scale. Methods students somehow manage to cover a broad range from liberal to conservative with the same basic teaching style. This may be an indication of their flexibility or it may reflect their confusion and search for a complete rationale.

While the MAPE is now routinely administered to student teachers, difficulties with external computer scoring have provided us with no data for 1978.

A follow-up study of undergraduates who have participated in the Science Teacher Preparation Program at the University of Iowa was begun in March 1976. The goal was to receive information aimed at improving the current UPSTEP Program through feedback from past graduates. This study was based on graduates from the Class of 1968 through the Class of 1975.

The follow-up study was sent to 161 persons. Thirty-four percent of the forms were returned completed; seven percent of the forms were not able to be forwarded; and, two percent of the recipients of the follow-up study responded with a letter

Mean Centile Scores and Ranges for Freshman Clinical Experience (A) and Second Methods Course (B)

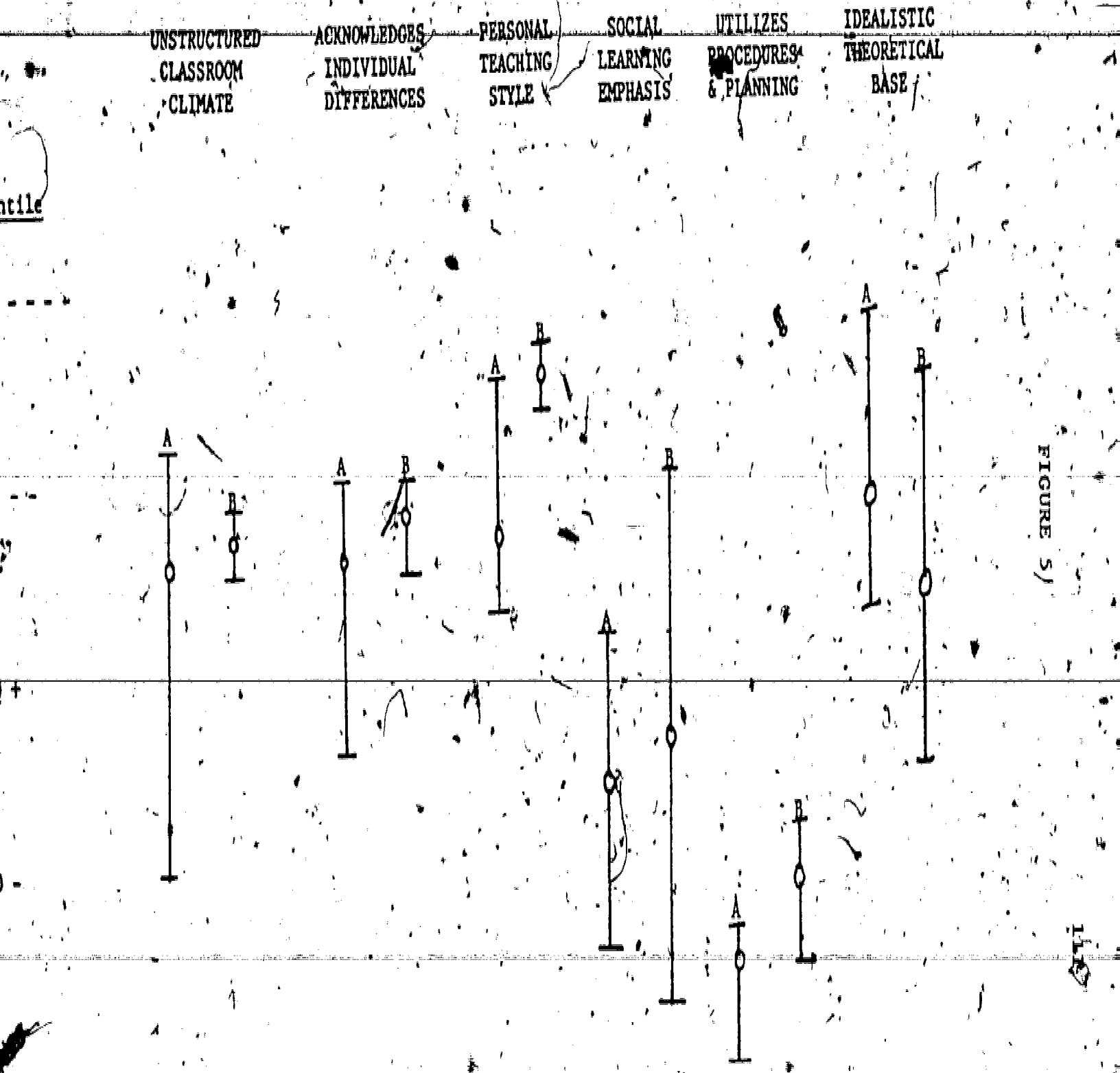


FIGURE 5

CONTROLLING CLASSROOM CLIMATE | DISREGARDS INDIVIDUAL DIFFERENCES | IMPERSONAL TEACHING STYLE | TEXTBOOK LEARNING EMPHASIS | DISTRUSTS PROCEDURES & PLANNING | PRAGMATIC THEORETICAL BASE

explaining why it would be inappropriate for them to complete the follow-up study. Portions of this follow-up are included in this section.

Most of the past graduates indicated a desire to stay in Iowa and felt that teaching allowed them opportunities to use their special abilities while being creative and original. Social status, prestige, and salary were viewed as relatively unimportant (Table 2).

Courses in science, experiences in student teaching, and teaching experience were viewed as the most important components of their teacher education. Ratings of specific professional education courses are shown in Table 3. Teacher education was also seen as important outside of the classroom (Table 4). Table 5 indicates how UPSTEP graduates perceive their need for eight specific skills and competencies and the extent to which the UPSTEP program provided these skills.

TABLE 2

FACTORS INFLUENCING ACCEPTANCE OF CURRENT EMPLOYMENT

	Highly Important	Somewhat Important	Somewhat Unimportant	Highly Unimportant	Omitted
a. Opportunity to use special abilities of aptitudes	52.1	35.4	12.5	0.0	0.0
b. Opportunity to earn a large salary	16.7	31.3	31.3	20.7	0.0
C. Opportunity to be creative and original	47.9	31.3	20.8	0.0	0.0
d. Social status and prestige	8.3	25.0	20.8	45.9	0.0
e. Opportunity to work with people	47.9	37.5	12.6	0.0	0.0
f. Opportunity to work with things rather than people	0.0	16.7	45.8	33.3	4.2
g. Freedom from supervision by others	14.6	47.9	25.0	10.4	2.1
H. Greater opportunity for advancement	18.8	39.6	29.1	10.4	2.1
i. Opportunity to exercise leadership	27.1	41.7	25.0	6.2	0.0
j. Opportunity to help and serve others	33.3	50.0	14.6	0.0	2.1
k. Adventure	22.9	27.1	20.8	27.1	2.1
l. Opportunity to work with adults rather than children	18.8	10.4	16.7	45.8	8.3
m. Felt better prepared for current position than teaching	16.7	10.4	6.3	35.4	31.2
n. Location of the employer	52.1	29.2	8.3	8.3	2.1
o. Dissatisfaction with prior educational experiences	12.5	20.8	18.8	37.5	10.4
p. Retirement, health care, and other benefits	14.6	20.8	25.0	37.5	2.1

TABLE 3

TEACHER EDUCATION EXPERIENCES USEFUL FOR CURRENT POSITION

	Essential	Very Useful	Somewhat Useful	Not Useful	Did Not Have
a. Experiences in Educational Psychology	6.1	20.4	36.7	36.7	0.0
b. Experiences in Instrutional Media	16.3	20.4	46.9	14.3	2.1
c. Experiences in Social Foundations of Education	0.0	10.2	30.6	34.7	24.5
d. Experiences in Teaching Methods	20.4	26.5	36.7	12.2	4.2
e. Student Teaching	38.8	26.5	14.3	18.3	2.1
f. Field Work, Observation, Practicum (Other than Student Teaching)	26.5	26.5	22.4	16.3	8.3

TABLE 4

IMPORTANCE OF TEACHER EDUCATION EXPERIENCES IN PERSONAL AND CIVIC LIFE

	Highly Important	Somewhat Important	Somewhat Unimportant	Highly Unimportant	Omitted
a. Developing an ability to get along with different types of people	22.4	40.8	24.5	12.3	0.0
b. Developing social poise	10.2	55.1	26.5	8.2	0.0
c. Developing a fund of knowledge useful in later life	18.4	40.8	28.6	12.2	0.0
d. Preparing for a satisfying family life	6.1	26.5	30.6	34.7	2.1
e. Developing better speaking habits	22.4	49.0	20.4	8.2	0.0
f. Developing moral capacities, ethical standards, and values	8.2	38.8	22.4	30.6	0.0
g. Developing leadership skills	16.3	51.0	18.4	14.3	0.0
h. Making the most out of my potential	22.4	40.8	14.3	20.4	2.1

TABLE 5

SELF-PERCEIVED SKILLS AND COMPETENCIES OF UPSTEP GRADUATES

	Importance in Current Position					Was UPSTEP Provision Adequate?		
	Highly Import.	Somewhat Import.	Somewhat Unimport.	Highly Unimport.	Omitted	Yes	No	Omitted
a. Skill in selecting & organizing materials	55.1	34.7	2.1	4.1	4.1	57.1	18.4	24.5
b. Skill in technique of instruction	55.1	26.5	6.1	8.2	4.1	55.1	24.5	20.4
c. Skill in group management	46.9	32.6	10.2	6.1	8.2	28.6	44.9	26.5
d. Skill in developing work habits	30.6	46.9	10.2	8.2	4.1	44.9	32.7	20.4
e. Skill in developing interpersonal relationships	57.1	34.7	6.1	0.0	2.1	34.7	40.8	22.5
f. Ability to profit from suggestions for improvement	40.8	46.9	8.2	0.0	4.1	57.1	18.7	24.5
g. Ability to evaluate own performance	63.3	24.5	4.1	0.0	4.1	51.0	24.5	24.5
h. Ability to evaluate the performance of others	42.9	34.7	12.2	4.1	6.1	49.0	24.5	26.5

When asked, "What are useful aspects of the Teacher Education Program with regards to personal and civic life?", UPSTEP graduates of 1968-1975 responded with:

No Response	19%
The ability to interact with and communicate with people	17%
An increase in public speaking ability and poise	9%
The student teaching experience	8%
Secondary and science methods experiences	6%
Being exposed to and working wiht all age levels of children	4%
The ability to write behavioral objectives	4%
Educational Psychology: concepts of motivation, reinforcement	4%
Developing leadership qualities and discussion techniques	4%
No aspect is applicable; I can't credit anything with the program	4%
Informal and social contacts with professors	
Ability to study special interests	
Lasting friendships which have developed from education program	
Ability to be and get organized	
Introduction to AV equipment and techniques	
The ability to relate to students as individuals - not in the traditional teacher-student syndrome	
Other responses not directly related	7%

When asked, "What are useful aspects of the Teacher Education Program with regards to occupation?", UPSTEP graduate of 1968-1975 responded with:

No Response	9%

Student teaching experience	23%
Methods	11%
Very little from education program--major and minor science areas of much more importance	6%
Working with and getting along with other people	4%
Educational Psychology	4%
Ability to organize materials and programs	4%
Introduction to the use of AV equipment and techniques	4%
Knowledge of educational curricular materials	4%
No aspect is applicable; can't credit anything to the education program	6%
Ability to cope with people	
Testing techniques	
Developing leadership qualities	
Ability to relate to students	
Self-confidence in public speaking	
Knowledge of how to use outside material	
Emphasis which was given to laboratory use and preparation	
Flexability of UPSTEP Program which allowed me to design programs of interest to me	
Pre-education practicum experiences	

1968-1975 graduates were also asked, "What specific aspects of the Teacher Education Program should be changed?"

No Response	21%
Student teaching experiences should be extended	9%
Extend methods courses and drop the Introduction to Secondary Education course	8%

Change or drop the Educational Psychology requirement	6%
More case analysis of disciplinary problems that new teachers are apt to be confronted with	6%
More instruction is needed regarding how to evaluate	6%
More experiences in working with low-ability students or unmotivated students is necessary	4%
The special problems of small town schools and teaching situations should be dealt with	4%
More instruction in the guidance field is needed	
More knowledge with regards to the types of educational media is needed	
More humanizing of course work is needed	
More experience working with children in child centered environments are necessary	
More one-to-one criticisms to discover weaknesses of the individual is needed prior to entering a classroom on our own (without being graded)	
More early experiences are needed in education	
More experience in individualized instruction	
Greater emphasis should be placed on child psychology	
Other responses (not directly related)	18.87%
No changes necessary	3.77%

The 1975-1978 Graduates

During the 1977-78 year, an additional twenty-nine students graduating between 1975-1978 were interviewed by two visiting professors (Novick and Yore, 1978). These interviews centered on four major areas of the UPSTEP Program, 1) The value of experiences, 2) University-field relationships, 3) Teaching views and practices, and 4) Inservice views.

Interviewees were asked to respond freely and as extensively as they wished. Each audio-taped interview was 30-6 minutes long. A selection of questions and responses is provided.

The 1975-78 graduates were asked to rate the value of experience in teacher education courses: "What specific experiences do you feel were helpful in developing your potential as a teacher?" "How have they been helpful?" "To what extent?" (See Table 6 for the percentage of graudates responding.)

It is evident that the field-based aspects of the program are perceived as the most useful by a majority of the graduates, both past and current. Descriptive phrases were: variety of classrooms, variety of clinical experiences, multiple practicums, variety of student teaching experiences, early field experiences, anything that approaches reality, flexibility.

Other questions asked graduate include the following:

a. Did the lack of certain experiences limit your ability to solve some problem which you now face or have faced in your teaching?

b. Now that you are a practicing teacher, what kinds of new or different activities would you recommend for our science teacher education program?

c. In retrospect, do you feel the science teacher education program should have placed more emphasis on certain areas or less emphasis on others?

The general pattern of response to these questions revealed that UPSTEP graduates believe that many practical and traditional teaching skills are missing from the program. The major clustering of responses were that:

1) more large group strategies should be explored. 45% of all the graduates interviewed mentioned the need for consideration of this topic. The responses were rather evenly distributed between past graduates (41%) and current graduates (50%);

2) more attention to classroom management, control, and discipline. 24% of the UPSTEP graduates suggested that greater attention needs to be directed toward

classroom management strategies. The distribution of responses were skewed toward past graduates (35%), with only 8% of the current graduates mentioning this factor;

3) more consideration of lesson planning, comparing curricula, and practical implementation procedures is needed. 24% of the graduates interviewed suggested that actual lesson planning utilizing practical eclectic methods, analysis of curricula and implementation methods were lacking in UPSTEP. These responses were slightly more frequent among past graduates (29%) than current graduates (17%);

4) testing and evaluation was judged lacking by 10% of the respondents; all these responses were from past graduates;

5) All other areas mentioned were less frequent than 10%. Some things mentioned were: children's rights, demonstrations, AV skills, first aid, motivation techniques, exceptional learners and actual teaching.

The interview revealed that 38% of the graduates believed that too much emphasis is placed on individualization. A slightly higher percentage of current graduates (42%) believed this than past graduates (35%).

Other minor trends illustrated were that past graduates believed that UPSTEP was too theoretical (12%), while current graduates expressed some dissatisfaction with the human relations and transactional analysis emphasis (17%).

Graduates also were asked "What did these professional courses provide for you as a teacher: Educational Psychology? Freshman Teaching Practicum? Methods I and II? and Student Teaching?" Responses to this question are classified in a frequency table of positive, indifferent, and negative comments toward the course (see Table 7). Cogent remarks are noted for each course.

TABLE 6

PERCENTAGE OF GRADUATES RESPONDING

Kind of Experience	Past Graduates (n=17)	Current Graduates (n=12)	Total (n=29)
Student Teaching	76	58	69
Methods Clinical Experience	53	67	59
SSTP Summer Activity	24	--	14
Elementary Practicum	24	42	31
Methods Activities (in general)	29	33	31
Microteaching	12	33	21
Examination of Curricular Materials	6	8	7
Piagetian Tasks	--	8	3
History and Philosophy of Science	--	8	3
Development and Use of Inquiry Materials	6	--	3
Writing a Self-Instructional Module	--	8	3

TABLE 7

DISTRIBUTION OF COMMENTS REGARDING UPSTEP COURSES

Course	Positive		Indifferent		Negative	
	Graduates		Graduates		Graduates	
	Past	Current	Past	Current	Past	Current
Freshman Clinical Experience*	6	6	1	1	0	2
Methods I	10	3	5	7	0	2
Methods II	10	4	4	3	1	4
Student Teaching	12	4	2	6	3	2
History/Philosophy of Science	8	2	0	2	2	1

* New course and not required of some students, therefore responses were limited.

The Freshman Clinical Experience was deemed valuable, but the need for closer integration of goals and the field experience was cited. Some concern was expressed regarding the value of observing elementary children in non-science learning situations.

The methods courses received varied assessment; generally, they were valued, but the graduates believed the courses were too one-sided, i.e., too heavy on individualization. A slight concern regarding the over emphasis of human relations training was apparent with current graduates. The field experiences were consistently mentioned as positive attributes and graduates encouraged the use of varied content, grade level, teaching strategy, etc. in field experiences.

Student teaching comments generally referred to the intern's placement with a suitable cooperating teacher.

History and Philosophy of Science courses received dipolar assessment; generally graduates found that courses interesting as an academic experience, but not directly relevant to teaching. Responses tend to become more positive in teachers with more experience. Obviously, more effort needs to be expended on integrating History and Philosophy into the teaching sequence.

Graduates were also asked to rank-order some aspects of the UPSTEP program which were of greatest value to them (Table 8).

TABLE 8

RANK ASPECTS OF UPSTEP PROGRAM

Aspect	Number of Citations		
	Rank 1	Rank 2	Rank 3
1. Student Teaching	12	5	2
2. Methods	2	4	4
3. SSTP		2	1
4. History and Philosophy of Science	2	2	2
5. Clinical Experience		2	1
6. Interpersonal relationships between Interns and Instructors	2	2	2
7. Preparation of self-instructional module	1	1	1
8. Looking at curricula			2
9. Flexibility of field experiences	2		
10. Designing lab experiences		1	
11. SATIC tapes		2	
12. Piaget	1		1
13. Exposure to non-traditional creative ways of teaching science		1	
14. Goal, idealism and philosophy of teaching	2		
15. Elementary practicum			1
16. Requirement of broad science background	1		
17. Lesson planning	1		
18. Case studies		1	
19. Inquiry learning	1		

Student teaching and field-based experiences stand out as the aspects of greatest value to the sample interviewed. A number of global aspects which were mentioned (6, 9, 13, 14, 16) should be noted, as well as some specific modules (7, 8, 10, 11, 12, 17, 18, and 19). The History and Philosophy of Science courses were cited six times, indicating that they have some impact on the UPSTEP interns.

Comments regarding the degree of integration between the university-based component of UPSTEP and the field-based component were varied and appeared to indicate a difference between current and past graduates regarding the integration within and between courses. The following generalizations appear to be supported by UPSTEP graduates:

1. Methods I has sound integration between classroom modules and field experiences as judged by both current and past graduates.
2. A majority of UPSTEP graduates believe that general program integration needs to be improved, with current graduates being more negative regarding integration than past graduates.
3. A general concern was expressed that Methods did not accurately reflect the reality of most science classrooms.

Some specific comments which provide insight regarding the degree of integration between university classroom activities and field experiences were made by the following interviewees:

6: In student teaching there was a gap between the real world and the exciting things in methods; I believe that the reason for this is not the cooperating teacher but rather constraints of facilities and time.

15: Yes, at times, particularly in Methods I; but I felt a need for more varied exposure.

17: More in-class follow-up and peer sharing needed.

18: Not at all, I was a puppet of the school system and could not apply what I learned at the university.

20: Methods I was very good, but did not match with student teaching.

22: Most closely as a freshman, but professors could be more involved in the field based experiences.

23: No, except for microteaching in Methods II.

24: No, university program and expectations did not match reality.

26: Not much integration, too stuch on fixed modules; in order to integrate clinical experiences special seminars are needed.

28: Not aligned well; Methods did not give mechanics of teaching; but were designed/to define our thoughts on what kind of teacher we want to be.

Analysis of the interviews regarding the relative contributions of the Methods instructors, university supervisors and cooperating teachers yielded that twenty seven of the twenty nine graduates had formulated an opinion. Of the twenty seven statements three graduates equated some contributions rather than ranking the contributions completely. Table 9 presents a summary of the relative rankings.

TABLE 9

FREQUENCY DISTRIBUTION OF THE RELATIVE CONTRIBUTIONS MADE BY METHODS INSTRUCTORS, UNIVERSITY SUPERVISORS, AND COOPERATING TEACHERS

	Relative Rank Assigned					
	First		Second		Third	
Graduates	Past	Current	Past	Current	Past	Current
Methods Instructors	4	3	9	4	2	5
University Supervisors	3	3	1	5	11	4
Cooperating Teachers	10	7	3	2	2	3

Inspection of the table indicates that UPSTEP graduates generally value the contributions made by cooperating teachers most and the contributions made by university supervisors least. Closer inspection of the recent graduates indicates that the contributions of the university supervisors has been assigned slightly higher value than the contributions of the Methods instructors.

Two of the past graduates (12%) and three of the current graduates (25%) interviewed expressed an overall negative reaction to the student teaching experience.

While a number of interviewees were satisfied with supervisor-student teacher relationship, a significant number (38%) felt the frequency of the supervising activity was inadequate. Perception of the cooperating teacher-student teacher relationship was mixed and seemed to depend mainly on the degree of personal rapport generated.

The following summarizes the various perceptions of the desired roles of the personnel involved in the student teaching experience:

Cooperating teacher:	classroom management and resources; control
Methods instructor:	provides realistic picture of today's classrooms; inquiry skills; research base for enlightened teaching; concrete, practical resources; control and motivation techniques; teaching skills and strategies
University supervisor:	liaison between university and cooperating teacher; trouble shooter; advisor to student teacher re: problems, planning, ideas; evaluator

Generally, an adult open relationship with all involved is desired, with increased freedom of action for the student-teacher. There seems to be little consistency in terms of which personnel should be responsible for the development of teaching and managment skills. There is a general perception of a gap between what is learned in Methods seminars and the demands of the real school situation and to some of the interviewees, this has been a source of frustration during student-teaching. One measure of success may be the student's commitment to education as evidenced by their desire to continue their own science education. (See Table 10.)

TABLE 10

PERCENTAGE OF INTERVIEWEES HAVING PLANS FOR POST-GRADUATE WORK IN EDUCATION

Past Graduates	24%
Current Graduates	67%
Total	41%

One past graduate has plans for post-graduate work in a science content area. Two past graduates wish to gain qualification for teaching at the junior college level.

Two of the current graduates explicitly stated they plan to do a doctorate in science education.

Opinions as to where in-service work should be conducted were divided and showed no clear pattern.

Generally UPSTEP Graduates' descriptions of ideal learning situations were oriented toward varying degrees of individualization (self-paced, open inquiry, student centered). These views are generally tempered by an awareness of classroom constraints and the need for some degree of structure. The generally progressive bent of the descriptions would seem to indicate that most of the interviewees concur with the philosophy of teaching stressed in UPSTEP, despite their criticism about the lack of exposure to a variety of teaching strategies.

Ideal Strategies as Expressed by UPSTEP Graduates

Conventional responses with varied degrees of perception; pre-post labs not clearly related to inquiry approach; do not in general view demonstrations as a valuable teaching tool; no extensive use of inquiry--appear to have very limited working definitions of inquiry which involves individualized student-centered learning; frequently cite large classes and kids' demands for answers as reasons for not using. Do not lecture frequently--chief purpose to convey information and explanation, frequently conducted as lecture-discussion; loops infrequently used--films more frequent but not, in general, as an integral part of the curriculum; most have some form of project work--varying from extra credit reports to investigating phenomena; very few things considered to be innovative.

How is Assessment Done?

Generally, a mis of standard techniques and kinds of examination questions. Not rigid in criteria for evaluation in the lab (interest, lab reports); not rigid in overall evaluation criteria; do not see degree of involvement of students as feedback information on the quality of their teaching.

What Curriculum Are You Using?

Generally using traditional or "alphabet course" texts and not unhappy with them. A number produce additional materials. One had developed own self-paced materials on large scale. Generally, not content knowledge bound--have broader goals including process and affective areas. Generally do not suggest salient areas of difficulty in student understanding. Most do not use the idea of a model as a central idea in their science teaching.

Other Measures

Several standardized measures were administered to 1977-78 UPSTEP Graduates at the completion of student teaching. These included the Test on Understanding Science (Tous, 1961), Science Attitude Inventory, (SAI, 1970), and Tennessee Self-Concept Scale (1965).

An inspection of the TOUS averages (Table 11) indicates that they are acceptably high; and when compared to the norms provided, the total TOUS mean (48.57) ranks at the 99th percentile (based on grade 12 norms). The UPSTEP Graduates' understanding about the scientific enterprise (scale 1) is reasonable as they scored on the average 15.36 out of a possible 18; while their understanding about scientists (scale 2) was slightly lower, averaging 14.21 out of a possible 18. The graduates averaged 19.00 out of a possible 24 on understanding about the methods and aims of science (scale 3).

TABLE 11

TOUS DESCRIPTIVE DATA AND STATISTICS
ON 1977-78 IOWA-UPSTEP GRADUATES

	Understanding About The Scientific Enterprise	Understanding About Scientists	Understanding About Methods and Aims of Science	Total Understanding of Science
Mean	15.36	14.21	19.00	48.57
Standard Deviation	2.30	1.72	3.31	5.26
Highest Possible Score	18	18	24	60

Table 12 illustrates that current UPSTEP Graduates have a positive attitude toward science on intellectual, (knowledge about nature of science), emotional (reaction to science), and total scales demonstrating average scores of 70.0 out of 90, 65.2 out of 90 and 135.7 out of 180.

The Tennessee Self-Concept data (Table 13) indicated that the average values on each scale for the current graduates of UPSTEP fall below the reported means (Fitts, 1965). The UPSTEP average for self-identity falls more than two standard deviations below the reported mean. Likewise these values are noticeably lower than reported by Pizzini (1973) for both UPSTEP students and a control group.

TABLE 12

SAI DESCRIPTIVE DATA AND STATISTICS
ON 1977-78 IOWA-UPSTEP GRADUATES

	Intellectual Scale	Emotional Scale	Total Scale
Mean	70.0	65.2	135.7
Standard Deviation	7.82	8.50	14.47
Total Possible	90	90	180

TABLE 13

TENNESSEE SELF-CONCEPT DESCRIPTIVE DATA AND STATISTICS ON
1977-78 IOWA-UPSTEP GRADUATES

	Physical Self	Moral-Ethical	Personal Self	Family Self	Social Self	Self Identity	Self-Satisfaction	Self-Behavior	Self-Criticism	Self-Esteem
Mean	58.86	54.07	58.43	60.14	60.00	100.79	95.14	93.57	30.14	319.64
Standard Deviation	11.05	11.21	5.98	10.70	6.40	19.71	11.99	12.06	5.08	44.53

In April, 1976, students currently enrolled in the UPSTEP program were requested to complete an UPSTEP Assessment Questionnaire. Information obtained for this Assessment Questionnaire isreported for all students enrolled in the UPSTEP program and has been subdivided into three categories representing those students who have not yet taken a methods course; those students who have taken, or who were currently enrolled in a methods course during the Spring, 1976 semester; and those students who were enrolled for student teaching during the Spring 1976 semester. (See Tables 14 and 15.)

TABLE 14

UPSTEP STUDENT 1976 AND 1977 ASSESSMENT

	IMPORTANT					
	A.		B.		C.	
	1976	1977	1976	1977	1976	1977
(a) Developing an ability to get along with different types of people	88	85	100	100	92	100
(b) Developing a fund of knowledge useful in later life	100	78	100	86	67	50
(c) Developing a sense of responsibility to participate in community and public affairs	89	78	57	79	50	83
(d) Developing an ability to develop and evaluate moral capacities, ethical standards, and values	63	53	62	79	67	50
(e) Developing self confidence	95	85	93	100	100	100
(f) Making the most out of my potential	88	90	93	100	100	100
(g) Developing communication skills	89	79	100	93	100	100
(h) Developing moral and ethical standards and values	53	53	50	78	67	83
(i) Developing leadership skills	100	69	75	100	100	100

A. Have not taken methods.
B. Have taken at least one methods course.
C. Current student teacher.

TABLE 15

STUDENT ASSESSMENT

Indicatewhether the UPSTEP teacher education program adequately provided for each.

	Is Provision Adequate?					
	A.		B.		C.	
	1976	1977	1976	1977	1976	1977
	yes	yes	yes	yes	yes	yes
(a) Skill in selecting and organizing materials	31%	53%	88%	57%	50%	33%
(b) Skill in technique of instruction	81%	63%	75%	86%	67%	17%
(c) Skill in group management	50%	53%	75%	36%	58%	0%
(d) Skill in developing work habits	2o%	47%	50%	36%	58%	0%
(e) Skill in developing interpersonal relationships . .	82%	79%	88%	100%	100%	100%
(f) Ability to profit from suggestions for improvement	94%	89%	100%	100%	92%	100%
(g) Ability to evaluate own performance	88%	89%	88%	93%	92%	83%
(h) Ability to evaluate the performance of others . . .	76%	84%	88%	86%	50%	67%

A. Have Not Taken Methods.

B. Have taken at least one methods course.

C. Current Studebt Teachers.

The UPSTEP Student Profile Report is a summary of selected information regarding the abilities of students who were enrolled in the UPSTEP Program for the academic years 1975-76 and 1978-80 in relation to the University of Iowa, national and state norms for the ACT Battery. The data in this report were collected in order to evaluate the caliber of students drawn to the UPSTEP Science Teacher Education Program. These data are being analyzed to assess the changes that occur during the UPSTEP years and to develop ways in which the UPSTEP Program can be more effectively tailored to fit the needs and interests of science students entering the University of Iowa.

Where available, national and Iowa results have been included to enable comparisons with students enrolled at other colleges and universities throughout the nation.

The national data cited in this report are for all new students enrolling at colleges and universities throughout the nation in the Fall of 1975 and 1978. This information was obtained through the Evaluation and Examination Service, the University of Iowa. References to "state" data have been obtained through the same source and are results based on all college-bound students in the state of Iowa who took the ACT Battery between October, 1974 and April, 1975 and in 1976-78. References to percentile ranks on ACT Battery for the University of Iowa are based on students entering the University of Iowa in September 1973 through 1978.

The data presented here regarding the UPSTEP Program are an update of previously reported ACT scores and student enrollment. The earlier data may be found in Technical Report 8, Baseline Data Concerning Science Teacher Education Program at the University of Iowa, Table 45, page 54.

As is evidenced by this update, the UPSTEP Program continues to attract

exceptional students. The fact still remains that due to the high caliber of participants in the UPSTEP Program, the students involved have had and continue to have a wide range of professional choices available to them. This is one of the factors influencing the drop out rate as the science education sequence progresses. Comparison ACT scores for all students in the UPSTEP Program and new freshmen are shown in Table 16. Relative rankings of UPSTEP students for 1975-76 and 1978-80 are shown in Figures 6 and 7.

TABLE 16

Standard Scores on ACT Battery
A = 1975-76 B = 1976-78 *

		ENGLISH		MATHEMATICS		SOCIAL STUDIES		NATURAL SCIENCE		COMPOSITE	
		A	B	A	B	A	B	A	B	A	B
New Freshman Liberal Arts Students	Mean	22	21	24	23	24	22	26	25	24	23
N_A=7640, N_B=8047	S.D.	4	4	6	7	6	6	5	6	4	5
New Freshman Liberal Arts with indicated pre-medicine major	Mean	22	22	28	27	25	25	29	28	26	26
N_A=613, N_B=494	S.D.	4	4	5	5	5	6	4	5	4	4
All UPSTEP Students	Mean	23	21	27	28	25	24	28	27	26	24
N_A=89, N_B=62	S.D.	4	4	5	4	4	3	4	4	4	4

* for UPSTEP Students; A = 1975-76, B = 1978-80

Comparison of the Mean ACT Scores with Means of Other Groups

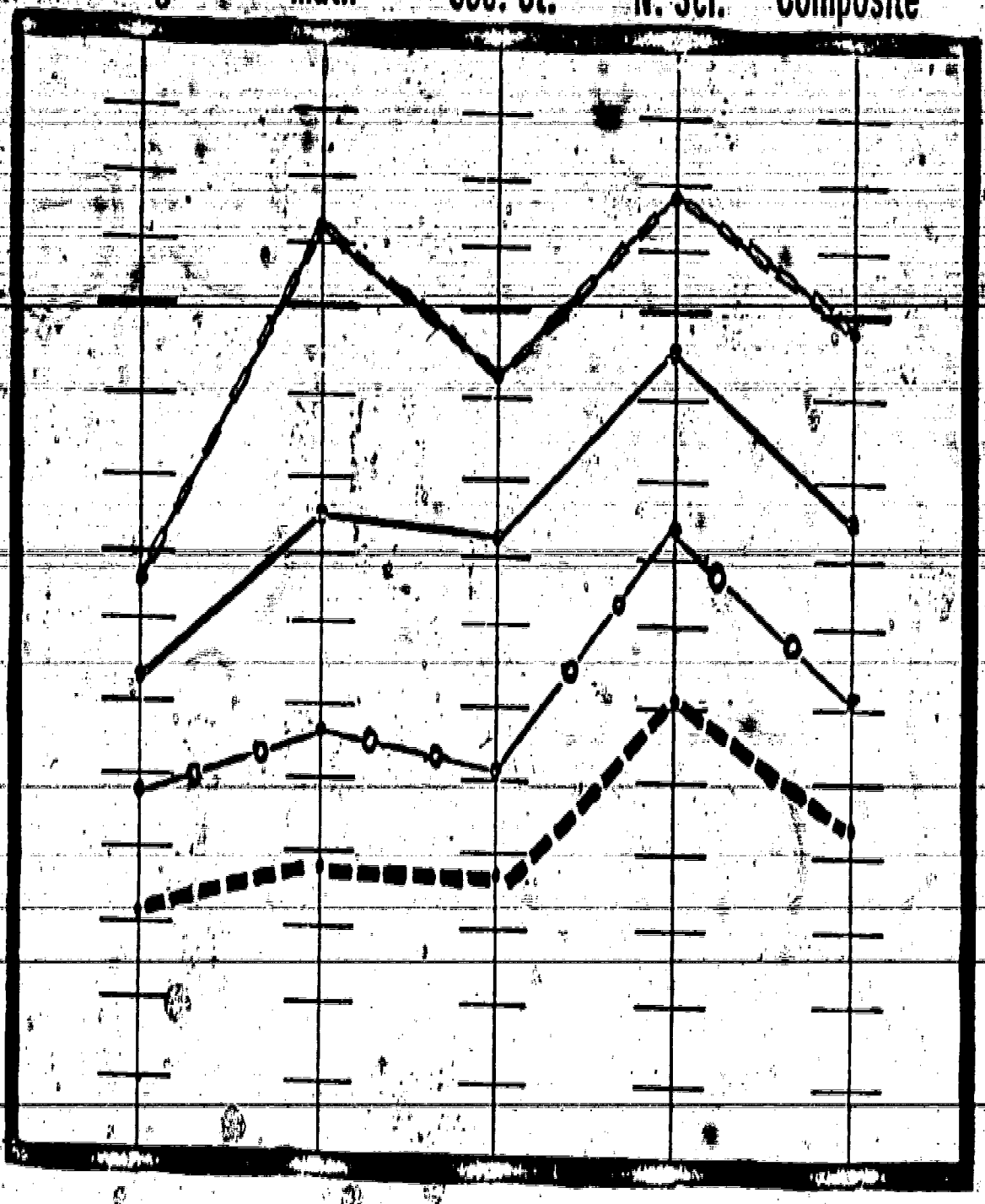


FIGURE 6
1975-76

	Eng.	Math	Soc. St.	N. Sci.	Composite
National Mean:	18.2	18.9	18.7	21.1	19.9
State Mean:	19.8	20.6	20.1	23.4	21.1
Local Mean:	21.3	23.5	23.2	25.5	23.5
UPSTEP Mean:	22.6	27.3	25.3	27.9	25.9

National: ▬ ▬ ▬ State: o—o Local: ●—● UPSTEP: ▬ ▬ ▬

Comparison of the Mean ACT Scores with Means of Other Groups

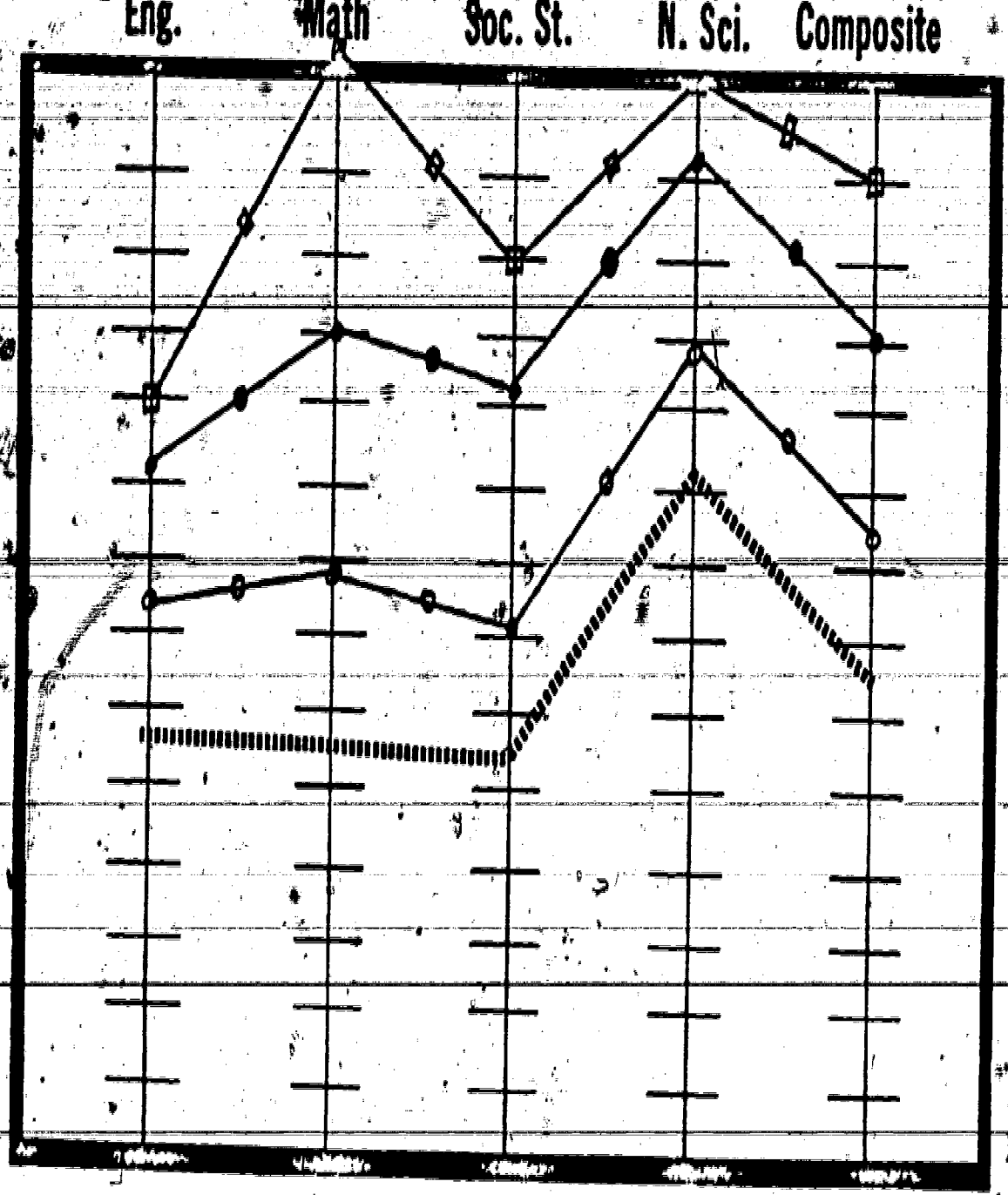


FIGURE 7
1978-80

	Eng.	Math	Soc. St.	N. Sci.	Composite
National Mean:	17.7	17.6	17.4	21.1	18.6
State Mean:	19.4	19.8	19.1	22.9	20.4
Local Mean:	21.2	23.0	22.2	25.2	23.0
Upstep Mean:	22	27	24	26	25

National: ■■■ State: ●-●-● Local: ●— Upstep: □-□-□

B. Self Assessment of Teaching Behaviors

SATIC (Figure 8) (Schlitt and Abraham, 1973) is a checklist instrument which measures the type and amount of verbal behaviors exhibited by a teacher during a lesson. It provides no value judgments in itself but can be interpreted in light of teaching goals. SATIC was designed solely to provide feedback and not as a research instrument.

In the UPSTEP program, SATIC is introduced via a self-instructional module and students are expected to use SATIC during every clinical experience. During early clinical activities, students are encouraged to work on changing the frequency of only one behavior at a time. Later, a full analysis of each lesson is expected.

Since SATIC is a meaure of verbal behavior, behaviors are easily coded from tapes of a students lessons. UPSTEP students code themselves, determine what they are doing in a classroom, and then compare this activity with their stated goals. Such feedback and self-evaluation should be very effective in changing teacher behaviors. The ability to use SATIC is developed most fully during Methods I.

In Methods II, students approach teaching behaviors from a research base. Desirability of specific behaviors on the SATIC instrument are evaluated in light of research evidence as to their effect on students and compared to UPSTEP student goals. From this, Methods II students develop a desired pattern of behaviors and attempt to implement it. (While SATIC does not retain information about sequence of behaviors, it does allow some idea of sequencing since, typically, a given lesson contains only a fraction of the toal number of different SATIC categories.)

Since UPSTEP students are frequently attempting to alter specific behaviors

or patterns of behavior, the SATIC results of those lessons become difficult to interpret. The data in Table 17, for instance, indicate that 1976-79 graduates are just as directive while student teaching as they were a year earlier in Methods I. They also ask about the same number of questions but do have a higher Interaction Index, an indication that they are responding to students more.

The present analysis is very incomplete because of the lack of compilation of data for 1980 and the overall small numbers. Efforts are also being made to look at specific behaviors rather than groups of behaviors. Students have additionally been encouraged to modify the SATIC to suit their own needs- a situation that does not make group analysis any easier.

While students have not always felt positive about SATIC (Table 18), we feel that as a result of using SATIC, our students have become more capable of objective self-evaluation of verbal behavior and can better suggest changes and improvements. Since self-evaluation is an important goal of the UPSTEP program, this allows us to better model our goals while still insuring that students are getting feedback on their teaching. This modeling has caused some of our UPSTEP students to try various forms of self-assessment and evaluation with their students, providing a cooperative venture rather than a unilateral decision on the part of the teacher.

Teacher: _____ Topic: _____ Date: _____

Observer: _____ Interaction Index ($\frac{\text{Total R}}{\text{Total I}}$): _____

TEACHING BEHAVIORS	TALLY MARKS	TOTALS	PERCENTAGES
Initiatory (talking)			
1. Lectures or gives directions.			
2. Makes statement or asks rhetorical question.			
Initiatory (questioning)			
3. Asks short-answer question.			
4. Asks extended-answer question.			
		Total I →	Percent of I
Responding (teacher-centered)			
5. Rejects student comment, answer or question.			
6. Accepts student comment or answer.			
7. Confirms student comment or answer.			
8. Repeats student comment or answer.			
9. Clarifies or interprets what student said.			
10. Answers student question.			
Responding (student-centered)			
11. Asks student to clarify or elaborate.			
12. Uses student question or idea.			
13.			
14.			
		Total R →	Percent of R

Comments:

FIGURE 8
SATIC* Coding Sheet

*A system of teacher evaluation devised by Dorothy M. Schiltt and Michael Abraham

TABLE 17

MEAN SATIC SCORES (IN PERCENTS) AND INTERACTION INDEX

BY CLASS AND GRADUATION DATE

	Methods I			Methods II			Student Teaching		
	A*	B*	C*	A	B	C	A	B	C
$\bar{X}$ 1977 (N=11)	28	33	0.59	11	49	0.84	15	32	0.84
$\bar{X}$ 1978 (N=6)	19	47	0.55	8	46	0.93	20	38	0.77
$\bar{X}$ 1979 (N=11)	23	36	0.61	8	44	0.95	17	40	0.82
$\bar{X}$ 1976-79 (N=32)	24	36	0.58	10	45	0.81	23	36	0.75

*A = Teacher directions and evaluation (Categories 1, 5, 7)

*B = Teacher Questions (SATIC Categories 3, 4, 11, 12)

*C = Interaction Index (Categories $\frac{5 - 12}{1 - 4}$), a measure of Teacher Response versus Teacher Initiation

TABLE 18

PERCENTAGE DISTRIBUTION OF RESPONSES TO:

Has the use of SATIC proven to be valuable for you (if the instrument was used in any of your courses)?

	Past Graduates (n=11)	Current Graduates (n=12)	Total (n=23)
Positive	55	33	43
Qualified Positive	9	17	13
Negative	36	50	43

Summary and Conclusions

The Iowa-UPSTEP Model has grown and developed over the last nine years. In many respects the model matured in 1975--the last year for developmental support from the National Science Foundation. Currently, support is provided by a grant pick-up program from the Iowa Board of Regents and an additional five year grant from NSF emphasizing the development and formative evaluation of teacher education modules.

The evolution of Iowa-UPSTEP has been fairly rapid with significant changes each year through 1977. What began as a relatively conventional program is now a four-year, clinically oriented science teacher preparation program providing undergraduates with early opportunities to deal with realities of science teaching. These early opportunities allow an equally early commitment to science education or change career goals.

The descriptive evidence indicates a number of strengths of the Iowa-UPSTEP program:

1. Cooperating teachers have extensive and varied teaching experience and strong content preparation;
2. A nucleaus of nearly 18 cooperating teachers view themselves as "UPSTEP Cooperating Teachers" and specifically request UPSTEP students;
3. UPSTEP students seem to be developing a common orientation in their philosophies of education, indicating that the program is having more than a cognitive impact;
4. Student do see teaching as providing opportunities to be creative and original;

5. Experience in professional education courses of the UPSTEP program are viewed as important by the students;
6. What they learned in the UPSTEP program is viewed by graduates as being important outside the classroom;
7. Field experiences of the UPSTEP program are perceived as valuable by students and cooperating teachers;
8. The program is seen as flexible, humanistic, and experiential;
9. History and philosophy of science components are seen by past graduates as useful;
10. Methods I and classroom modules are seen as integrated;
11. Students express more holistic, humanistic views of science and teaching;
12. Most students plan on some form of graduate program;
13. Students want to implement individualized programs;
14. UPSTEP graduates rank very high on their understanding of science;
15. UPSTEP students have a high positive attitude toward science;
16. The program is attracting high-caliber students as evidenced by ACT scores;
17. Students are competent at systematic, objective self-evaluation;
18. Teaching behaviors are approaching the norms desired by the UPSTEP staff;
19. UPSTEP students do develop a research-based rationale for teaching;
20. UPSTEP students do feel a lot of comradeship with other students as well as with staff;
21. UPSTEP has an early, varied, and extensive field experience;
22. Capstone courses in Socio-Biology, Applied Chemistry and Physics, field experiences in Earth Science and Environmental Education are provided;
23. UPSTEP graduates are in demand by school systems.

Weaknesses in the UPSTEP program include:

1. A higher dropout rate (about 50%) than we would like;
2. Not all students view the Methods experience and its components as valuable;
3. Students feel that some critical teaching skills are insufficient in the program. These include:
   a. large group strategies and management;
   b. classroom control and discipline;
   c. lesson planning;
   d. test design;
   e. how to lecture;
4. Students feel too much emphsis is placed on individualization;
5. UPSTEP students are not as positive about self-evaluation as we would like;
6. History and Philosophy of Science are not seen as integral components of the program and are not always viewed as having direct application in the classroom;
7. Equipment use and maintenance skills are not adequately stressed;
8. Staff always seem to be "two years" ahead of what they have recorded on paper and this is frustrating to all concerned.

Overall, we feel the Iowa-UPSTEP program has been highly successful and is a model teacher education program. Current students feel relatively positive about the program and their experiences and post graduates seem to be highly competent teachers.

The UPSTEP program will continue to respond to students whil striving for excellence and positive growth--just as we hope UPSTEP students will.

APPENDIX 1

Findings and Recommendations of Two Visiting Professors

Based on our direct experience with UPSTEP, reading research studies, articles, modules, publications, and grant proposals related to UPSTEP; sampling data from UPSTEP teaching assistants and graduates, and discussions with UPSTEP staff and cooperating teachers, the following findings and recommendations were generated.

Field Experiences

The early, varied, and extensive field experiences of Iowa-UPSTEP seems to be the program's strongest and most unique attribute. Maintaining the variety of grade levels and teaching strategies to which UPSTEP interns are exposed is of prime importance. The inclusion of the SSTP, elementary school, junior high school, and senior high school practica provides an experiencial spectrum which may be unique to Iowa-UPSTEP. Several refinements of these experiences may increase their effectiveness: 1) assuming that each intern encounters diverse teaching strategies in the field; 2) enlisting a cadre of supportive and illustrative cooperating teachers; 3) reorganizing the time schedule so that each clinical experience falls early in the term. If additional clinical experiences become feasible, an experience with retarded children, in cooperation with the University Hospital School should be considered.

Interpersonal Relations

The positive rapport between UPSTEP staff and interns is a characteristic too often missing in academic institutions. It is encouraging to note that interns have developed a similar rapport in their classrooms.

Informal discussion, generally open office doors, and casual socials should be continued and facilitated whenever possible.

Development of Personal Goals for Science Teaching

A distinct thread woven through the fiber of Iowa-UPSTEP is the effort to encourage and facilitate the development by interns of their own personal goals for science instruction. Although this effort may not win immediate acceptance, it is valued by the interns later. Several factors appear to contribute to this success: 1) the exposure to various strategies, grade levels, type of students; 2) significant concern for this issue across courses, including the History and Philosophy of Science component of the program. Possible extension to the elementary practicum is worthy of exploration. The History and Philosophy of Science Courses could have greater impact if they were to explore practical classroom applications of their content, ideas, and processes. Interns generally believe that exploring the nature of science, the scientific enterprise, and contemporary science issues are interesting and of value to themselves; however, many do not see any direct classroom application in this area.

Survival Skills

Summary observation reports by student teaching supervisors, together with interview responses of UPSTEP graduates, strongly indicate a need to strengthen the UPSTEP program in the general science area of large-group teaching, which is the predominant instructional mode of student teachers and recent graduates.

Consideration should be given to the following areas (the order is not intended to convey relative importance):

1. Group questioning skills and strategies. Student teaching supervisors consistently cited this area as weak.
2. Group discussion strategies. These should include:
   a. pre-lab, lab, post-lab discussion;
   b. lecture demonstration;
   c. large group inquiry discussion.
3. Classroom management-discipline. Interview responses strongly indicate that this area should be the primary responsibility of the cooperating teacher in the student teaching experience.
4. Audiovisual machine skills. At present these are not adequately covered in any of the university-based experiences. Some interns acquire audiovisual skills during their student-teaching experience. However, we recommend that a one or two semester hour course in the media department be incorporated in the UPSTEP program. This course should deal with machine skills, material selection and production, and classroom uses.
5. Selection and adaptation of widely used curriculum programs and materials. There are two points of view regarding a rationale for instructional planning activities. The first emphasizes the development of fairly original materials, while the second emphasizes the selection and adaptation of commercial and curriculum project materials. We feel that most beginning teachers will use the latter and should therefore be at least knowledgeable about the strengths and weaknesses of the major curricular programs in their teaching field.
6. Practical evaluation techniques. Interview responses indicate that most UPSTEP graduates concentrate on routine paper-and-pencil testing. Activities should be generated which emphasize non-conventional evaluation techniques (such as observational checklists, lab practicals, problem situations), as well as simplified statistical techniques for analyzing classroom tests.

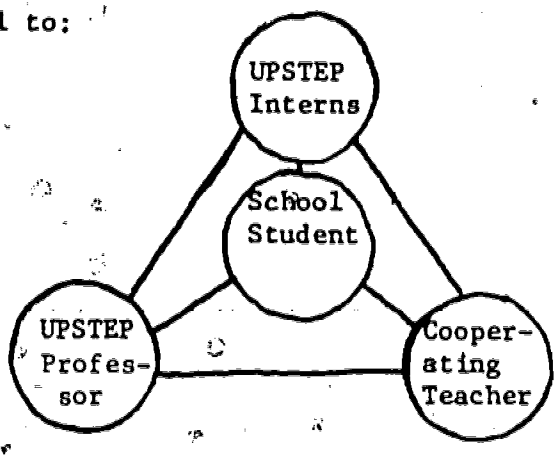
University Field Integration

UPSTEP graduates value the contributions made by the field experiences significantly more than any other component of the program; likewise they

value the contribution made by the cooperating teachers more highly than the university professors and significantly more than the university supervisors. Informal observations indicate that the student-teaching field experience involves minimal professorial time commitment. Interview responses also indicate that the university supervisor's role, other than as an evaluator, is generally perceived to be a minor one. In view of these observations, it appears to us that Iowa-UPSTEP should take steps to clarify the roles and responsibilities of the field experiences supervisors. We propose the following suggestions for consideration:

1. The university-based UPSTEP activities need to more accurately reflect the realities of today's public schools, while striving to change them. The present UPSTEP program tends to over-emphasize a single intructional strategy which is not frequently used in many of our public schools. Increased attention to other instructional strategies, i.e., group inquiry; pre-lab, lab, post-lab; lecture; multi-media and demonstration-discussion, and specific survival skills will increase the credibility of university experiences and personnel.
2. The identification, selection, and development of a cadre of diverse and effective cooperating teachers is needed to increase the effectiveness and compatibility of clinical experiences placements. At present UPSTEP does not devote enough effort to achieve optional clinical placements; inappropriate experiences and personality conflicts have occurred too frequently.
   a. An effort to locate, educate, and reward specific cooperating teachers as UPSTEP staff associates in key schools has potential.
   b. The development of regular workshops and socials with cooperating teachers may improve the harmony and effectiveness of university-school interaction. At present many of the cooperating teachers do not know one another or UPSTEP staff members. Also many cooperating teachers are uncertain of their responsibilities and lack skills and techniques appropriate to effective supervision.
3. UPSTEP needs to allocate more professorial time to direct supervision

of the field experiences. Ideally the role of university supervisor should be eliminated and the duties reallocated to the university professor and cooperating teacher, thus simplying the player model to:



The simpler model would have fewer and shorter lines of communications, thus improving the integration and rapport between university and field. Closer association with the field experience would facilitate meaningful follow-up and sharing of experiences.

APPENDIX 2

EVALUATIONS OF FIRST YEAR TEACHERS BY THEIR EMPLOYERS

The following are follow-up reports of the progress of recent Iowa graduates currently teaching. They were written by school officials, principals, department chairpersons, and administrative assistants. They offer a glimpse of how a school administrator perceives first year teachers and what they view to be important criteria of success--read them and profit.

1968-1975 Graduates

We have found Mr. A to be every bit as capable as we thought that he might be at the time that we hired him. Very concerned about his responsibilities to the youngsters and the Science program that he is involved in. He is somewhat reserved, has a good professional attitude and is dedicated to improving the total teaching environment. He is doing fine and we are quite pleased with him.

B is doing a very fine job here at NN High School. He has developed excellent rapport with the students and staff and I see him developing into a very excellent teacher.

C is doing an average job. He has improved considerably, but still has a ways to go in regard to student control. He is pleasant, however, and has a fine attitude.

Mr. D came to our school system about one year ago now--he came into a difficult situation and has done an excellent job. He is interested in young people, has good rapport with them, is willing to give of his time, and in general takes steps to be effective with Junior High students. He sponsors and helped organize two new clubs this year. We feel Mr. D is an asset to our faculty.

E is doing a fine job--with experience he will be a top notch teacher.

Mr. F is teaching two classes of biology, one class of physics, one class of chemistry and is assistant basketball coach. His schedule is somewhat overloaded and this has reduced his overall effectiveness. Next year his schedule will have to be reduced. His relationship with students is excellent and he has a good professional attitude. I would rate him above average in his first year of teaching.

Mr. G has been teaching High School Physics and Chemistry in the FM Community High School since the beginning of the school term in 1972. He is very well prepared and certainly does understand these two teaching fields. He approaches classroom assignments with a positive assurance that he knows what he is teaching. His introductions to lessons are very well done. I have been informed that he makes excellent use of audio visual materials. He is most cooperative with the other teachers at the high school level and with the administration. He is concerned about students and tries to do all he can to motivate them and to meet their needs.
We have found Mr. G to be very enthusiastic about teaching, very dependable, and I rate him as excellent.

Mr. H has been a fine first-year teacher. He has replaced a teacher who retired after 30 years of teaching. Mr. H has been well accepted by the faculty and students and has become totally involved in EP Community High School. We are pleased to have him as a faculty member and feel that each year he will continue to contribute towards a better science department.

Mr. I is currently teaching Chemistry and Physics at NC High School. Mr I is very conscientious, spends a good deal of time in classroom preparation, and is striving to master the overall needs of a classroom teacher. However, he is in need of improvement in motivation and direction in instructional learning activities, rapport with students, and needs to strengthen his voice presentation in the classroom.
I have personally visited Mr. I's classes on two different occasions and feel that with additional experience he will become a productive classroom teacher.

Mr. J is progressing very well for a first year teacher. As with most beginning teachers he hesitates to take a firm enough position on discipline. However, his attitude is excellent toward seeking and accepting suggestions for improving his teaching. He is doing an excellent job of working with the boys as wrestling coach.

Mr. K is an excellent teacher with good student relationship. K has served here for five months, so it is a little difficult to ascertain success in teaching each pupil the entire course. Mr. K is friendly, cooperative, and is an asset to the community.

1976 Graduates

An appraisal of teacher service completed in May of 1977 by the administrative staff at NWHS indicated that Mr. S's performance was generally satisfactory.

Comments from that evaluation include: " . . . . Mr. S has improved since his January appraisal but is still short of being satisfactory in several categories." The "categories" considered "short of satisfactory" were: Knowledge of Subject Matter, Teaching Techniques, Classroom Organization, Classroom Atmosphere, and Appearance.

D is a dedicated young man. Works well with students and possesses excellent ability. He has given of his time most generously and I am happy to have him on the H staff.

Mr. S appeared to lack those skills necessary to be a successful teacher in our school. His attitude, both professionally and individually as a person was excellent although still marginal an an instructor; he has shown growth this year. His high spirit of cooperation seems to indicate that he will continue to improve his expertise in teaching. It is indeed unfortunate that an individual could progress through his advance education courses and student teaching and not gain those skills necessary to be a teacher. His knowledge of course work is adequate.

Ms. U teaches individualized science. I have been extremely pleased with her efforts as a first year teacher. She is competent and knowledgeable in her subject area. She also is creative and shows a tremendous willingness to commit the necessary time and effort to expand and improve our individualized program. She has adopted a new experimental science program called ISIS and is implementing the program this semester.

One of her strongest assets is her empathy with the low achiever. She cares about those kids and they know it.

B is doing a fine job as a first year teacher. He is particularly strong teaching and working with low-ability students. He has the ability to use terms that make understanding science much easier for them. He also recognizes that there are limitations on the kind and complexity of the concepts taught to these students.

B's weakness would seem to be that he is somewhat of an individualist and consequently is criticized, sometimes unjustly, for his "Kotter" imago.

Mrs. J has proved herself to be a very proficient teacher. We are happy with her progress and performance here in S school.

Mr. M is well prepared and qualified. He lacks personal confidence which is sometimes sensed by students and parents. His strongest field is chemistry in which he is more than adequately prepared. His lack of confidence comes from within himself not from his lack of knowledge.

In Physics he is less well prepared and therefore more uncertain because of this.

He works well with the students and is most generous in giving extra time.

He is gaining confidence as he gains experience, however. His intensiveness is lessening, also. We will offer him a contract next year.

Mr. H has done a fine job as a first year teacher in this system. I have seen signs of great enthusiasm and ability and he works well with youngsters. I will certainly recommend him for re-employment.

G has been employed in the 6 area school district since September, 1976, as a high school physics and mathematics teacher. Although I have not had a great deal of direct contact with him, the reports from his supervisor, including the building principal, have been very strong. He appears to be doing a very fine job during this, his initial year.

1977 Graduates

Mrs. E has been an excellent addition to our science staff. Her assignment is seventh grade ISCS science and one period of ninth grade life science.

Mrs. E has spent a great deal of extra time preparing for her classes and this is very apparent in the steady development of her good success with pupils and very little in the way of discipline problems. She is definitely student oriented and has gotten to know her students, as people, in great depth.

F has made improvements in his teaching during the course of the year. His main strengths center around dependability, knowledge of subject matter, and interest in the school. His major weaknesses include inability to communicate with students so as to best benefit the educational process. He also has trouble lowering instruction to the learning level of the students.

Excellent teacher -- doing a fine job!

Captain M has done a very satisfactory grade of work at the Missouri Military Academy thus far in 1977-78 as mathematics instructor, coach, and dormitory resident. We feel he has a very great future at our institution.

Doing quite well for a first year teacher. Very enthusiastic toward her work - good rapport with students. Learning lesson plan preparation rather slowly but "coming around". Needs to improve in disciplinary field. Needs to learn to teacher 50 minutes in a 50 minute class period. Personal dress, grooming, etc, very good.

This is M's first year on the staff of AC Elementary school. She is teaching 7th and 8th grade science--earth and life sciences. I have been very impressed with M's teaching ability and, more expecially, with her character and her rapport with junior high students. I feel she is very well qualified, knows her materials thoroughly and by using varied techniques, makes her classes interesting and profitable for the students. In the area of discipline M has shown continuing improvement. At no time was her discipline poor, but, like most first year teachers, she has had to learn to achieve a balance of structure and freedom. She has been very easy to work with--asking for help when it's needed, accepting suggestions but not becoming too dependent on anyone else. Her rapport with other teachers and students is, I feel, her greatest asset. She really likes and respects the students. This has, in turn, earned their trust and respect. She is an asset to the staff--generous and positive. We are privileged to have M on our staff.

J had good laboratory exercises, thus making biology interesting for his students. Students responded well to J's efforts to educate them. Class was always under control and yet the atmosphere open.

J was active in many of the extra curricular programs. He assisted in our succesful annual spring musical. J appeared to have a genuine concern for students both during school and after school hours.

I believe that J is a better than average teacher with very good student rapport. J will continue to improve and should be quite successful in education.

C is doing an outstanding job as a Biology and Chemistry teacher in the I-35 high school.

She knows her materials well and has a way of putting it across to the students. She willingly accepts and conscientiously performs the extra duties assigned to her. She demands a great deal from her students. We are well pleased with the job she is doing.

Mr. P is doing an exemplary job of teaching 7th and 8th grade science. He is quiet, thorough, and very conscientious. He is also very creative in the classroom situation, and searches for ways to make the class pleasant for the students. He is always well-groomed and is a fine example to our students. Mr. P relates well both to faculty and students, and is highly respected by both.

REFERENCES

Abraham, M.R. and Schlitt, D.M. Verbal interaction: a means for self-evaluation, School Science and Mathematics, November, 1973, Vol. 73, (8), 478-486.

Fitts, W.H. Tennessee Self-Concept Scale. Nashville, Tennessee, 1965.

Golman, M.E. Selected teacher traits characteristic of inquiry science teachers and an analysis of the development of these traits in science methods students. Unpublished Ph.D. dissertation, University of Iowa, 1973.

Guertin, W.H., Litcher, J.H. and Hedges, W.D. Multi-Dimensional Assessment of Philosophy of Education, copyright by authors, 1973.

Phillips, D.K. Pre-education practicum: it's influence upon the students' pupil control ideology. Unpublished Ph.D. thesis, University of Iowa, 1976.

Pizzini, E.L. An analysis of the effect of an undergraduate preservice teacher education program on selected personal characteristics. Unpublished Ph.D. dissertation, University of Iowa, 1973.

Test on Understanding Science, Harvard University, 1971.

Yager, R.E. NSF Proposal for Iowa Undergraduate Preservice Teacher Education Program, Unpublished, March, 1970.

APPENDIX 3

Biographical Form for Cooperating Teachers

During each Spring semester, biographical information is obtained on the secondary and elementary cooperating teachers who contribute to the science teacher education programs at the University of Iowa. Ninety-five percent of the secondary teachers have responded to the Biographical Form for Cooperating Teachers while only seventy-two percent of the elementary teachers have completed the form.

The purpose of the Biographical Form for Cooperating Teachers is to obtain information which will aid in successfully matching student teachers to the special interests and experiences of the cooperating teachers in the future.

In an effective teacher education program, prospective teachers must be provided with the knowledge, expertise, and experience necessary for becoming a successful teacher. Cooperating teachers are essential to the UPSTEP program, and proper communications are essential to achieve the goals of the program. Optimum communication is necessarily based upon understanding, and the data collected here will help to promote that understanding.

This report is a summary of the information contained within the Biographical Form for Cooperating Teachers.

Elementary Cooperating Teachers

1975-79

A. Average age of elementary cooperating teachers: 36.8

B. All of the elementary cooperating teachers teach in the 4th, 5th, or 6th grade. Many of the elementary cooperating teachers teach all academic subject areas.

C. Areas of concentration for Bachelor's Degree
   1. Major areas of concentration:
      Biology
      Elementary Education
      English and Plastic Art
      Political Science
   2. Minor areas of concentration:
      Bible Studies
      Botany
      Psychology
      Social Science
      Social Studies
      Zoology
      English

D. Sixty-one percent of the elementary cooperating teachers have earned a Master's Degree
   1. Major areas of concentration:
      Elementary Administration
      Elementary Education
      Reading and Language Arts
      Special Education
   2. Minor areas of concentration:
      Elementary Education

E. Twenty-four percent of the elementary cooperating teachers are involved with extra-curricular activities
   1. Outdoor Education Program
   2. Recreational Activities
   3. Safety Patrol

F. Institutes from which elementary cooperating teachers have earned degrees or have done advanced work are:
   Colorado State
   Goshen College
   Kansas State Teachers College
   University of Iowa
   University of Vermont
   Winona State University
   University of Northern Iowa
   Central College

Elementary Cooperating Teachers (continued)

G. Years of teaching experience:
   1. On the average, the elementary cooperating teachers have been teaching for 11 years
   2. Twelve percent of the elementary cooperating teachers have had high school teaching experience. Of these teachers they have on the average taught high school for one year.
   3. Eleven percent of the elementary cooperating teachers have had junior high school teaching experience. Of these teachers they have on the average taught junior high school for five years.
   4. The elementary cooperating teachers have on the average been teaching elementary school for ten years.

H. One hundred percent of the elementary cooperating teachers have worked with student teachers prior to this year.

I. Number of semester hours completed in the following areas

1.	Education:	Average	56.2 semester hours
2.	Life Science:	Average	16.0 semester hours
3.	Earth Science:	Average	5.1 semester hours
4.	Chemistry:	Average	3.0 semester hours
5.	Physics:	Average	1.0 semester hours

J. None of the elementary cooperating teachers have been affiliated with UPSTEP summer conferences.

Secondary Cooperating Teachers
1975-1979

A. Average age of secondary cooperating teachers: 41.2

B. The following courses are taught by cooperating teachers affiliated with the UPSTEP Program:
- Advanced Biology
- Animal Behavior
- Astronomy
- Biological Problems
- Cell Biology
- Chemistry
- Comparative Vertebrate Zoology
- Earth Science
- Environmental Studies
- Evolution and Variety of Life
- Field Biology
- Human Anatomy and Physiology
- Introductory Biology
- PACE Chemistry
- Physical Science
- Physics

C. Areas of concentration for Bachelor's Degree
1. Major areas of concentration:
- Biology
- Engineering
- General Science
- Geology
- Physical Education
- Physics
- Social Science

2. Minor areas of concentration:
- Biology
- Chemistry
- Education
- English
- General Science
- History
- Mathematics
- Physical Education
- Social Studies

D. Eighty-nine percent of the secondary cooperating teachers have earned a Master's Degree
1. Major areas of concentration:
- Biology
- Botany
- General Science
- Geology
- Physiology
- Secondary School Administration
- Science Education
- Zoology

2. Minor areas of concentration:
- Chemistry
- Geology
- Mining
- Physics
- Zoology
- History

Secondary Cooperating Teachers (continued)

E. Fifty-four percent of the secondary cooperating teachers are involved with coaching or extra-curricular activities
   1. Coaching: Basketball, Football, Golf, Track
   2. Extra-Curricular: Honor Society, I'll Never Smoke Club, Iowa Naturalist Club, Volleyball

F. Institutes from which secondary cooperating teachers have earned degrees or have done advanced work are:

Atlanta University	Stanford University
Buena Vista College	University of Iowa
Drake University	University of New Mexico
Grinnell College	University of Northern Colorado
Iowa State Teachers College	University of Northern Iowa
Iowa State University	University of South Dakota
Loras College	University of Wisconsin
Princeton University	Wartburg College
South Dakota School of Mining & Technology	

G. Years of teaching experience:
   1. On the average, the secondary cooperating teachers have been teaching for sixteen years
   2. Eighty-nine percent of the secondary cooperating teachers have had high school teaching experience. Of these teachers they have on the average taught high school for fourteen years.
   3. Sixty percent of the secondary cooperating teachers have had junior high school teaching experience. Of these teachers they have on the average taught junior high school for seven years.
   4. Six percent of the secondary cooperating teachers have had elementary teaching experience before becoming secondary teachers. Of these teachers they have on the average taught elementary school for one year.

H. Ninety-one percent of the cooperating teachers have worked with student teachers prior to this year.

I. Number of semester hours completed in the following areas
   1. Education: Average 47.5 semester hours
   2. Life Science: Average 46.5 semester hours
   3. Earth Science: Average 16.8 semester hours
   4. Chemistry: Average 18.6 semester hours
   5. Physics: Average 13.0 semester hours

J. Twenty-two percent of the secondary cooperating teachers have been affiliated with UPSTEP summer conferences.

APPENDIX 4

UPSTEP - Student Assessment, Parts I and II

In April 1976, (and again in 1977 and 1978) students enrolled in the UPSTEP Program were requested to complete an UPSTEP Assessment Questionnaire.

Information obtained from this Assessment Questionnaire is reported for all students enrolled in the UPSTEP Program and has been subdivided into three categories representing those students who have not yet taken a methods course; those students who have taken, or who were currently enrolled in a methods course; and, those students who were enrolled for student teaching.

Table 19-22 provide data on student perceptors of the effect of various components of the UPSTEP program.

UPSTEP-Assessment Part II provides anedotal data about student perceptions and feelings in regard to the program.

TABLE 19

Student Assessment Summary

Students were asked to indicate the importance of their teacher education experiences in preparing them for each of the following statements. The following results represent all students in the UPSTEP Program.

	Highly Important	Somewhat Important	Somewhat Un-Important	Highly Un-Important
(a) Developing an ability to get along with different types of people	68%	26%	6%	0%
(b) Developing a fund of knowledge useful in later life	19%	71%	0%	0%
(c) Developing a sense of responsibility to participate in community and public affairs	9%	58%	28%	5%
(d) Developing an ability to develop and evaluate moral capacities, ethical standards, and values	29%	39%	32%	0%
(e) Developing self confidence	55%	39%	6%	0%
(f) Making the most out of my potential	55%	35%	7%	3%
(g) Developing communication skills	82%	20%	0%	0%
(h) Developing moral and ethical standards and values	17%	40%	39%	4%
(i) Developing leadership skills	37%	55%	7%	1%

Indicate whether the UPSTEP teacher education program adequately provided for each.

	Is Provision Adequate? yes
(a) Skill in selecting and organizing materials	60%
(b) Skill in technique of instruction	75%
(c) Skill in group management	57%
(d) Skill in developing work habits	44%
(e) Skill in developing interpersonal relationships	91%
(f) Ability to profit from suggestions for improvement	93%
(g) Ability to evaluate own performance	91%
(h) Ability to evaluate the performance of others	81%

TABLE 20

Student Assessment - Pre-methods

The following results represent those UPSTEP students who have not taken a methods course.

	Highly Important	Somewhat Important	Somewhat Un-Important	Highly Un-Important
(a) Developing an ability to get along with different types of people	67%	24%	9%	0%
(b) Developing a fund of knowledge useful in later life	19%	80%	1%	0%
(c) Developing a sense of responsibility to participate in community and public affairs	15%	70%	10%	5%
(d) Developing an ability to develop and evaluate moral capacities, ethical standards, and values	27%	10%	33%	0%
(e) Developing self confidence			5%	0%
(f) Making the most out of my potential	61%	24%	10%	5%
(g) Developing communication skills	80%	19%	1%	0%
(h) Developing moral and ethical standards and values	10%	52%	33%	5%
(i) Developing leadership skills	40%	51%	9%	0%

Indicate whether the UPSTEP teacher education program adequately provided for each.

	Is Provision Adequate? yes
(a) Skill in selecting and organizing materials	30%
(b) Skill in technique of instruction	79%
(c) Skill in group management	47%
(d) Skill in developing work habits	31%
(e) Skill in developing interpersonal relationships	89%
(f) Ability to profit from suggestions for improvement	93%
(g) Ability to evaluate own performance	87%
(h) Ability to evaluate the performance of others	80%

TABLE 22

Student Assessment

Student Teachers

The following results represent those UPSTEP students who were enrolled for student teaching.

	Highly Important	Somewhat Important	Somewhat Un-Important	Highly Un-Important
(a) Developing an ability to get along with different types of people	83%	10%	7%	0%
(b) Developing a fund of knowledge useful in later life	18%	51%	30%	1%
(c) Developing a sense of responsibility to participate in community and public affairs	1%	45%	49%	5%
(d) Developing an ability to develop and evaluate moral capacities, ethical standards, and values	41%	27%	30%	2%
(e) Developing self confidence	60%	39%	1%	0%
(f) Making the most out of my potential	58%	41%	1%	0%
(g) Developing communication skills	93%	7%	0%	0%
(h) Developing moral and ethical standards and values	40%	27%	23%	10%
(i) Developing leadership skills	49%	51%	0%	0%

Indicate whether the UPSTEP teacher education program adequately provided for each.

	Is Provision Adequate? yes
(a) Skill in selecting and organizing materials	51%
(b) Skill in technique of instruction	71%
(c) Skill in group management	55%
(d) Skill in developing work habits	57%
(e) Skill in developing interpersonal relationships	100%
(f) Ability to profit from suggestions for improvement	93%
(g) Ability to evaluate own performance	93%
(h) Ability to evaluate the performance of others	50%

UPSTEP Assessment Part II 1976-77

Students were asked to indicate which courses they had taken prior to the Spring 1976 semester and which courses they were enrolled in during the Spring 1976 semester.

_____	97:110	- Seminar Research in Science Education
_____	7S:100	- Introduction to Secondary School Teaching
_____	7S:91	- Pre-Education Practicum
_____	7P:75	- Educational Psychology and Measurement
_____	7S:151	- Methods Physical Science
_____	7S:152	- Methods Biological Science
_____	7S:190	- Observation and Lab Practice
_____	7S:191	- Student Teacher
_____	7S:192	- Student Teacher

Students were asked to give their perceptions of the present UPSTEP Program in terms of the following questions.

What do you feel are some unique points of the UPSTEP Program? Why are these unique?

See Section A.

What are your general feelings about the UPSTEP Program?

See Section B.

How does UPSTEP compare with other teacher preparation programs with which you are acquainted?

See Section C.

List any suggestions you may have for program improvement.

See Section D.

A - Unique Points

Student responses regarding what they feel to be unique points regarding the UPSTEP Program.

A. Students who have not had a methods course.

I want to be an elementary teacher.
The way we are started out in the elementary school first impressed me.
Pre-ed Practicum is an innovative program.
So far I have seen nothing unique in the UPSTEP program.
People in the program are friendly and helpful and concerned about the student.
The openess of the staff.
The instructors are incredibly helpful to the individual.
Helps you learn what teaching really is by starting early with practicums.
An atmosphere of cooperation.
The ability of UPSTEP to focus directly on science education.
A lot of emphasis on taking courses with relevance rather than education rsquirements.
The UPSTEP program is humanistic.
Now I know I want to be a pharmacist.

B. Students who have had or are currently enrolled in a methods course but have not atudent taught.

They seem to have a specific philosophy in mind.
The development of teaching and interacting with students on an individual basis.
Students are really encouraged to take an active part in the program.
It is a chance to get to know the professors and T.'s quite well.
You can be open in your ideas and problems.
Get to know other students in UPSTEP quite well.
The program is flexible enough so that it can fit your needs.
The early experience working with kids in school.
It's unhippocritical.
The general atmosphere is very enjoyable.
Teachers really seem to value your feelings as well as your performance.
The porgram seems more student-oriented than most such programs.
Teachers usually practice what they preach.
Methods helped me pull a lot of pieces together.

C. Students who were enrolled for student teaching.

The instructors are great to talk to you individually and offer praise and criticism.
I know most of the people in the department and they know me by name.
It's nice to know our comments are respected and wanted.
I have had twice as much experience in the classroom than other atudent teachers.
Early experience in schools allow you to see if you really want to be a teacher.
I think it has made me more creative by making me less inhibited about utilizing various methods not normally used.
Now I'm comfortable being watched.
I can really see how to do it now.

B - General Feelings

Student responses regarding their general feeling about the UPSTEP Program.

A. Students who have not had a methods course.

It shows me what I missed.
Keep positive
I like it. There is a good familiarity between staff and students.
Good program in that it opens up the classroom to you.
I think it is great and the whole university should be run the same way.
I think it is a good program for future science teachers.
I enjoy UPSTEP courses.
UPSTEP allows you to familiarize yourself with teacher situations you may have to confront.
UPSTEP has helped me in determining if I want to become a teacher.
UPSTEP lets you see what classroom situations are all about.
Comfortable.

B. Students who have had or are currently enrolled in a methods course but have not student taught.

I like it.
It provides a variety of experiences plus we work with many of the materials we will work with when we teach.
I'm glad I'm in the program.
I enjoy the program, but like any other program there could be a few improvements.
I like the program and the assistance I receive.
UPSTEP gives me a chance not only to look at teaching, but science teaching specifically.
I feel like I'm finally doing something worthwhile.

C. Students who were enrolled for student teaching.

Lately it doesn't have the zip it had a few years back.
Basically good.
I like it- it likes me.
It is tremendous.
Too much emphasis is placed on interpersonal relationships.
UPSTEP provides a valuable service and I like it.
Good cooperating teacher.
I appreciate the feedback I get.

Student responses regarding how the UPSTEP Program compares with other teacher preparation programs with which they are acquainted.

A. Students who have not had a methods course.

I'm not acquainted with any other teacher education programs.
Much better overall- treats people as individuals and as friends, not numbers to be eliminated from the classes.
Much more personal.
More interaction in classroom at earlier time.
More encouragement and enthusiasm.

UPSTEP is better because it provides classroom involvement along with student discussions. It is nice to share experience with others.
Better organized and more responsive towards individual student needs.
We get some supervision.

B. Students who have had or are currently enrolled in a methods course but have not student taught.

Not acquainted with any other program.
This program gets you experience with the kids and schools earlier than most.
Seems much closer to the students than elementary teacher programs.
It's different, less writing, more "hands on" type experience.
UPSTEP people seem more friendly and helpful than people in other programs.
Much more personal.
Takes longer, but is more thorough.

C. Students who were enrolled for student teaching.

It is very individualized.
Not acquainted with any other program.
Better staff-student interaction.
Superior
I got more visits than my friends in English.
Other student teachers can't even talk about their rationale. I don't think they have one!

D - Suggestions

Student suggestions for program improvement.

A. Students who have not had a methods course

There should be more courses like 7S:91. 7S:100 I think is a waste of time.
More involvement in practicum in the class and the students themselves.
That the UPSTEP student start at a higher grade level if they are going to teach in the higher grades in the future.
More experience in classroom management is needed.
Practicum students should be required to make up a simple educational unit with lectures, multimedia presentations and an evaluation with the help of participating teachers.
I'd like to do more teaching.

B. Students who have had or are currently enrolled in a methods course but have not student taught.

I can't really think of any. It's pretty good the way it is now.
A little less "busy type" work, such as encountered in the methods courses.
More time could be spent on developing skills.
More talking about specific teaching techniques.
More involvement in various classrooms throughout the Iowa City area.
My teacher kept mentioning the importance of student discussion and participation yet all he did was lecture. (7S:100)
Needs more credit.
More time in schools (7S:152)

C. Students who were enrolled for student teaching

Student teaching needs more supervision.
Need more chances for promoting discipline without being evaluated.
Would like more information about advantages and disadvantages of different methods.
More practical information about resources and curriculum.
Need time to allow student teacher to plan for student teaching experiences.
Student teaching goals can be accomplished in 12 weeks instead of 17 weeks.
Get rid of evaluating by tape.
Less talk in 7S:152 and greater emphasis on techniques of teaching difficult topics.
Expand it and make more students aware of its existence.
Sometimes they are too critical.

UPSTEP Assessment Part II - 1978-79

Students were asked to indicate which courses they had taken.

_____	97:110	- Seminar Research in Science Education
_____	7S:100	- Introduction to Secondary School Teaching
_____	7S:91	- Pre-Education Practicum
_____	7P:75	- Educational Psychology and Measurement
_____	7S:151	- Methods Physical Science
_____	7S:152	- Methods Biological Science
_____	7S:190	- Observation and Lab Practice
_____	7S:191	- Student Teacher
_____	7S:192	- Student Teacher

Students were asked to give their perceptions of the present UPSTEP Program in terms of the following questions.

What do you feel are some unique points of the UPSTEP Program? Why are these unique?

See A.

What are your general feelings about the UPSTEP Program?

See B.

How does UPSTEP compare with other teacher preparation programs with which you are acquainted?

See C.

List any suggestions you may have for program improvement.

See D.

A - Unique Points

Student responses regarding what they fell to be unique points regarding the UPSTEP Program.

A. Students who have not had a methods course.

Having seminars in practicum rather than just going to the school are beneficial.

Allows for contact with students of all age groups--not just at the secondaty level.

The Pre-Education Practicum in the elemenatry schools was a great idea.

I like the idea of experience elementary, junior high and high school education even though I will be teaching at the secondary level. It gives me a good idea of the exposure the kids have had to science before high school.

I think the availability of materials for the learning activities was a very good point.

Although I am not familiar with the program so much as the teacher within the program, I can safely say that it is designed to allow the individual the freedom to develop his/her own philosophy of education.

We're exposed to a lot of ideas and allowed to set our own standards.

The idea of placing students into classrooms before they student teach--this gives the student the opportunity to find out if he or she is really interested in teaching before it is too late.

Being in smaller classes and you have a chance to question and express feelings. Given direction but given no real answers. The modern teacher is a facilitator--not a teacher.

It seems fairly progressive. It is much better than I expected. I am happy with it so far. It stresses the teacher as facilitator and not dictator.

It allows experimentation and inquiry with guided teaching assistance.

It exposes the potential teacher to education at all levels. That is unique in that the teacher will know not only what point the students are at, but will have some idea of how they got there and where they are coming from.

The program presents a lot of different ideas and tries (I believe) to help the students see the advantages and disadvantages of different teaching methods. Also lets them make up their own mind.

The fact that it combines education and my major instead of trying to fight with two different colleges in accomplishing my major.

I feel I've learned a great deal in my experiences here this semester. I'm in this for exploratory reasons, and I've found the answers to my questions.

More individualized attention to each student.

B. Students who have had or are currently enrolled in a methods course but have not student taught.

Having students involved in the UPSTEP Program, working in schools--keeping in contact with a school environment. Also being introduced to different types of curriculum and teaching methods.

Having such a close knit group to work with. Everyone in the same area and knowing who can help you.

The experiences that you receive outside at the schools. The different grades that the methods classes expose you to give you a chance to interact with the students of different grades and see which students, if any, you can work with.

It's consolidated to a handy area and the poeple let one get to know the program and get involved, unlike other departments I've been in.

I feel it provides a wide range of experiences which may be helpful later. It exposes the student to many aspects of teaching I've never thought of before. It gives the student a wider perspective of education.

The emphasis on interpersonal skills is very important for the relatively new individualized programs where the interaction is on more of a one-to-one basis and there are specific skills such as questioning techniques which can be very beneficial to learn.

The modules generally provided awareness of the student as an individual, which makes the teacher-to-be more tuned in to these differences. Constructing a self-instructional unit was also unique--I didn't expect to actually be able to do something like it in a teacher-ed program.

Informal learning environment for students.

I have never been in classes where personal feelings and opinions are discussed. I like the interaction between students and teachers.

Good practical experience--where else could you get it unless you had a full or part-time job.

Grad school experience for secondary teachers in unique--I don't think the non-science people do it with the seminar part.

The continued actual classroom participation is unique.

Student teaching is not all in one 15 hour block. It is broken up to allow student teaching in various situations and to make it possible to experience teaching before the last semester of the 4th year. Only science ed does this.

Emphasis on human relations training as part of teacher training. Differs from the traditional teaching of content only.

Pre-ed practicum with elementary students. I know of no other secondary ed department that does this. An excellent idea in finding out where our secondary students "are coming from."

I like the splitting of student teaching into 2 semesters. What if a prospective teacher came to his final semester and found he couldn't stand teaching? It's unique as far as I know--no one else seems to be doing it.

Relationship between class and field practice.

Allowing students to interject their own feelings and ideas.

The student feels like he/she is a part of the program. In other areas of curriculum at the University of Iowa the programs are very impersonal.

I have the feeling of being part of a group or team, and I know there is always someone willing to talk and offer help if I want it.

C. Students who were enrolled for student teaching.

The individual attention you get from the staff. Anytime there is a problem you can find someone to talk to.

The way your are started as a freshman is good. Gets you in a program in the beginning.

The student teaching opportunities segments--gets you into a school early to be sure teaching is what you want.

Individual attention by teachers and staff--honest concern about you, your situation, your learning, your problems, etc. You get to know most of the staff and feel friends with them.

These are unique because I have friends in other departments who have expressed feelings of being "lost in the crowd" in large lecture rooms and of not being able to find someone to help them out with scheduling or problems.

There is a great deal of involvement in classrooms as part of the teacher preparation program with the practicum, field work in methods (Lunetta) and the 15 weeks of actual student teaching. This gives more exposure to different classroom climates and styles. The staff generally seems very enthusiastic, and interested in finding the best ways to teach science.

B - General Feelings

Student responses regarding their general feelings about the UPSTEP Program.

A. Students who have not had a methods course.

This is my first education course; I don't know enough about the overall program to evaluate it. It seems superior to the regular education programs however.

The pits. The seminar had its less than outstanding moments.

I like it, but there were a few things that bother me. Each teacher conveys his own personal view as to what form of teaching he believes most effective. While not forcing these views upon everyone, I still feel a bit intimidated.

The classes I have taken so far were not very interesting.

So-so.

Great program, and I plan to continue in it.

Good program.

I think it is helping people to become better teachers than were produced 10-20 years ago.

I feel it is one of the best programs available to any college student in the country.

At this point I'm in the program I don't think I'm qualified to make any real judgments. The feeling I have about it now however is basically good.

In general I'm really pleased with it.

There are always materials available for you to use--and we've read of many peoples ideas and beliefs on things--which has been helpful. The people are very helpful and friendly which impressed me as early as registration.

I like it.

B. Students who have had or were currently enrolled in a methods course, but have not yet completed their student teaching.

I feel it is definitely on the right track and is becoming a highly commendable program.

I like the atmosphere of knowing the staff. I didn't have this feeling during my pre-UPSTEP days at the University. Very favorable.

I have enjoyed UPSTEP and feel it has been valuable in preparing me to teach science.

The experiences provided through UPSTEP--are generally very good and most of all worthwhile.

So far I think it is good.

Satisfying--well equipped.

I have no negative criticism of the program in general.

It's very helpful in preparing a student for teaching.
For myself, the program (this methods course) "fills in the gaps" and has helped me to feel more capable of functioning as a teacher.
Feeling is good. Opportunity for improvement is available, so no problem that cannot be analyzed if not solved.
Pretty good--seems (at times) to be a lot of "busy work."
Practical experience is good--too much paper and language.

C. Students who were enrolled for student teaching.

I have enjoyed it very much, even going through it as quickly as I did. I felt I was exposed to a lot of new ideas. There are a few weaknesses though, with perhaps some more realistic activities and approaches needed in some of the pre-student teaching courses. I felt Herb Brunkhorst was a very helpful and encouraging supervisor.
I feel that it is a program of people who care, but very little if anything can be done to <u>really</u> get us ready for student teaching. You can help us develop certain talents for teaching, but you cannot connect them up into a satisfied, effective teacher in our student time. This <u>must</u> come from experience.
The methods classes should provide the student teacher with useful information (testing, grading, etc.) instead of useless questions and noble ideologies about what we think we'd do in or with the child that you'll have one of in 15 years of teaching.
I think it's a good program.

C - Comparison

Student responses regarding how the UPSTEP Program compares with other teacher preparation programs with which they are acquainted.

A. Student who have not had a methods course.

Earlier contact level with students.
The science education courses seem superior to regular education courses I have heard about. This seems to be a much more personal department and a student doesn't so easily become lost in the shuffle as those in secondary or elementary education do.
From what I have heard this is much better.
It provides more opportunities as far as interactions with specific teaching experiences are concerned.
So far with my little experience it is the first class I have ever taken where I didn't feel like a nobody and was not here just for attendance reasons but because I felt I was getting something out of this.
It is more tuned to teacher-student behaviors and interaction.

B. Students who have had or were currently enrolled in a methods course but have not yet student taught.

Seems to have more obligations and earlier in-the-schools parctice.
More publicity of the UPSTEP program to graduate students. (Not familiar with any other teacher programs.)
Its emphasis is very different from the teacher ed program I had previously gone through, which was oriented toward more practical aspects of teaching, and the student teaching experiences were situations where you were the teacher--emphasized knowing the student as a person, but not on an individualized instruction or curricula.
More open to new ideas, somewhat more real-world oriented. Though sometimes a bit too confusing in what courses need to be taken and not a good enough explanation of what the course will be about beforehand.
Very favorably, judging from conversations I have had with people in other programs.
More practical.

C. Student who were enrolled in student teaching.

From the war stories of the other student teacher preparation programs, it is a great improvement, but I am of the unshakable belief that we need more large class experience before beginning teaching. We do get more pre-student teaching experience than the other programs, but it is too much of one kind: the easy part of teaching, which is 1 on 1 to 1 on 5 discussions.

The only other one I know about is Coe's which just has you student teaching ½ the semester. I think teaching the full semester is better.

Suggestions

Student suggestions for progr[illegible]ement.

A. Students who have not had a [illegible]s course.

More chance for experience.
More contact with more credit for time spent doing so.
Working with and planning the activities were the best part. If we could do more of this I think the program could be improved.
The 7S:100 class is pretty bad. Any change would probably be an improvement. I realize this is part of the education department but perhaps some type of arrangement could be made to have the science education department teach what they want and test how they like instead of following the objectives of the present 7S:100.
Less B.S. and busy work.
More teacher-student, person-to-person emphasis. How to generate interest on part of students. Developing a teaching personality.

B. Students who have had or were currently enrolled in a methods course, but who have not yet completed their student teaching.

7S:151 should meet twice a week for a shorter period of time.
Not enough time was given to the idea of management in the classroom. Not just one kid but when 30 kids decide to play. How do you gain control and keep it. Being an intern leaves you mainly on with a lot of frustrating questions and a lot of paper work from the methods class.
7S:151 needs better organization; i.e., more realistic goals where amount of work is concerned; more realistic pacing of modules. There were too many modules towards end of semester.
More time spent on discussing problems faced out in your classes. Not so much module work.
Where do interns learn how to cope in large-group situations? How do they become acquainted with making up and scoring tests (i.e., evaluation) 2nd efficient use of time (lesson plans) in a non-individualized situation? It seems UPSTEP focuses on the ideal teacher (2nd sem.) on a 1st teaching job. (Or ARE these more practical things incorporated into other UPSTEP courses I'm unfamiliar with?)
More publicity of the UPSTEP Program to graduate students.
I think a whole semester (3hr./wk.) in one elementary school was not at all helpful. I was not exposed to any science. Perhaps other elementary schools could be part of the semester instead of just one.
Ed. Psych. had nothing to say about test design 7S:152 dealt with it only briefly.

C. Students who were enrolled for student teaching.

The supervisor for discussions in our student teaching seminar dominates the discussions to such an extent that we have difficulty expressing

our own feelings towards what is happening in the schools. As with all student teaching discussions, it is a waste of tiem because I feel that we are there to do work for him (especially the discussion on the school-community packet) rather than for him to work on our side to help better our education. I also question the effectiveness of having us go teach for Malcolm Gore with his Pace Chemistry. I feel that a half a semester in there will help us develop our 1 on 1 on 3 skills, but we need much more practice in the 1 on 15 or 1 on 25 classroom leading situations.

Close contact with cooperating teachers. I felt I was assigned him it was up to me to do everything. He didn't know what to expect of me and I didn't know what to do. It should be thoroughly explained in the beginning that we would only be there ½ days.

S.T. seminar was a waste of time. We have too much to do at night to sit around and chat for 2 hours.

More practical things taught--was at a loss when got into the school (i.e., A.V.)

Eliminate 79:190 as a 3-hr. course; and combine T.W. & TH. student teaching. To do this, you must have some one that will accept a curriculum that could be used during your student teaching. The way it is now, we are developing curriculums that supervising teachers would be afraid to let us use, since they must ultimately answer to the parents of kids who are suddenly flunking.

First of all, someone should be aware that not all Ed. Psych. courses have measurement attached, and that is one area in which I feel I have little preparation, especially since my cooperating teacher leans strongly toward only multiple choice. It could perhaps be discussed more in methods. (See attached sheet.)

Also, I feel now that too much time was spent in methods on microteaching and self-evaluation. While I think self-evaluation is important I feel that I need more experience in a repertoire of techniques before self-evaluation can be most effective. The seminar attached with student teaching seemed to be without much direction. I think we could have benefited more by doing even just one module as it was meant to be done, and discussing it (it's good to allow the student teachers to talk more to each other about experiences) than to be critiquing all the modules we saw. I never clearly understood our function in the class.

I felt the supervision was good. Herb always offered helpful suggestions. I wish there had been more time to talk to him about different points because I was always having to back to a class, maybe once every two weeks the supervisor could sit down with each student teacher after school and have time to talk. I enjoyed the program very much and I felt I gained a lot of new insights into both science and education.

Better selection of cooperating teachers--I realize this is a difficult task but I think improvement could be made in this area--Perhaps you could sit down with cooperating teacher and student teacher prior to student teaching and discuss and work out certain things like what exactly (?) is expected of cooperating teachers and student teachers in terms of responsibility or guiding of the classes, time spent in school, what the student teacher can and can not do, etc. I felt like all through the UPSTEP program the staff took a lot of time to work with me, etc., and that they really cared about me and then when student teaching started I felt like I was just thrown out on my own.

I think the student teacher seminars need improvement--I'm not sure what the purpose of them was or how much I gained from them--sometimes they seemed irrelevant to me. Perhaps meetings at the school with student teachers from that school would be enough.

I don't think its a good idea to have student teachers taking that curriculum project course at the same time as student teaching. There just isn't time.

Make sure the student teachers are getting the fair amount of credit for student teaching in relation to amount of classes they're teaching etc. I don't think perhaps they should take it the semester prior to student teaching and use it during student teaching.

More preparation on the more "pratical aspects of teaching" prior to student teaching such as test writing, lesson plans, organization, giving lectures, leading discussions, etc. I didn't feel adequately prepared in these areas (i.e., developing ideas for "units," leading field trips). I felt like I was high idealistic and not enough pratical when I came into student teaching. Maybe it was just me. But it's kind of disillusioning and has left me a bit bitter.

There should be a better blend of idealism and theory, and practical aspects.

APPENDIX 5

Science Teacher Education Program (STEP) Inventory

The statements in this inventory describe a variety of components which may be incorporated in a science teacher education program. For each statement, mark the number to the left which best matches the degree to which the specific program incorporates this particular component. The highest level of agreement will be marked three (3) while a lack of the specific component will result in a mark of zero (0) with varying degrees in between. Note that in some items only two (2) options are provided. In these items: one (1) = yes; zero (0) = no.

Distribution of Teaching Assistants responses located just below inventory responses: ( )

I. Integration and Sequence of Academic Program and Educational Experiences

A. Duration of professional education component:

1 0 (4) 1. One year following graduation.

1 0 (4) 2. Two years beginning in the senior year.

1 0 (2 2) 3. Two year beginning in the junior year.

1 0 (3 1) 4. More than two years.

B. Sequence of experiences:

3 2 1 0 (4) 1. There is a definite specified sequence of activities and courses in the program.

3 2 1 0 (2 1 1) 2. The program provides a number of optional and alternative courses and activities that provide flexibility and help to meet the needs of individual pre-service teachers.

C. Observation of teaching prior to the teaching experiences:

1 0 (3 1) 1. Pre-service students spend up to two weeks in observations in school.

1 0 (3 1) 2. Pre-service students spend more than two weeks in observations

in school.

D. Time for teaching experiences in schools:

1 0 (3 1) 1. One block of practice teaching for several weeks in the final year.

1 0 (3) 2. Two blocks of practice teaching in the final year.

1 0 (3) 3. Practice teaching spread over two years or more.

E. Teaching experience organization:

3 2 1 0 (1 2) (1) 1. Individual pre-service student works with one primary cooperating teacher.

3 2 1 0 (1) (2) 2. Two or three pre-service students work as a team with one cooperating teacher.

3 2 1 0 (1) (1 1) 3. Pre-service students work with more than one cooperating teacher.

F. Integration of university-based and school-based experience:

3 2 1 0 (1 1 2) 1. There is carefully planned integration.

3 2 1 0 (1 1 1) 2. Many activities have integrated experiences.

3 2 1 0 (2 2) G. Cooperating teachers participate in special instruction organized by the teacher education institution.

H. Science courses:

3 2 1 0 (1 2) (1) 1. Pre-service teachers take all science courses at the university science departments.

3 2 1 0 (4) 2. Pre-service teachers take all their science courses in the science education department.

3 2 1 0 (1 1 1 1) 3. There is a planned sequence of science courses, some of which are taken in science departments and some in science education.

I. Education courses. Pre-service teachers take education courses that treat the following topics in depth:

1 0 (2 2) 1. History of education.

1 0 (2 2) 2. Philosophy of education.

1 0 (4) 3. Educational psychology.

1 0 (1 2)	4. Sociology of education.
1 0 (1 2)	5. Educational technology.
1 0 (2 1)	6. Developmental psychology.
1 0 (2 1)	7. Moral educational and human values.
1 0	8. _____
1 0	9. _____
3 2 1 0 (1) (2)	10. There is close coordination of topics and courses offered in science education with other professional education courses.
3 2 1 0 (2) (1 1)	J. Pre-service teachers study education in courses with peers majoring in a broad array of academic disciplines.
	K. Pre-service science teachers participate in "methods" courses with peers majoring in:
1 0 (3)	1. One science discipline (e.g., physics, biology).
1 0 (4)	2. Different science disciplines.
1 0 (3)	3. Science and mathematics.
1 0 (3)	4. A broad array of disciplines.
	L. Pre-service teachers participate in "methods" courses taught by:
3 2 1 0 (2 1)	1. One instructor, a university professor.
3 2 1 0 (1) (3)	2. More than one instructor, all university professors.
3 2 1 0 (1) (2)	3. University professors and instructors who are practicing teachers.
3 2 1 0 (4)	M. Pre-service and in-service programs are coordinated.
3 2 1 0 (1 1 1 1)	N. The professional education program includes relevant extra-curricular social and professional growth activities.

II. Curriculum Beyond the Separate Science Disciplines

The program provides regular opportunities for pre-service teachers to:

	A. Penetrate deeply into the content, conceptual framework and methodology of one science discipline achieving the following competencies:

3 2 1 0 1. Explain and interrelate specified fundamental models, concepts, principles and experiments in the field.

3 2 1 0 2. Describe historical development of significant concepts and the relationships of these concept developments to society, to technology and to scientific thought generally.

3 2 1 0 3. Analyze specified problems or systems quantitatively and apply the principles of the field to discover solutions.

3 2 1 0 4. Design and conduct original experiments that develop knowledge that is new or at least new for the student.

3 2 1 0 5. Use measuring techniques and procedures with units, equipment and standards appropriate to the field.

3 2 1 0 6. Process and interpret data using a broad range of techniques and instrumentation characteristic of the field.

B. Study science broadly by having taken, regardless of the teaching major, laboratory courses involving concepts and processes from:

3 2 1 0 1. Biology.

3 2 1 0 2. Chemistry.

3 2 1 0 3. Physics.

3 2 1 0 4. Earth science.

3 2 1 0 C. Study interdisciplinary courses such as environmental science.

D. Acquire mathematical competencies in:

(Biological science major)

3 2 1 0 1. Algebra.

3 2 1 0 2. Trigonometry.

3 2 1 0 3. Differential and integral calculus.

3 2 1 0 4. Probability and statistics.

3 2 1 0 5. Simple computer programming.

(Physical science major)

3 2 1 0 1. Algebra.

3 2 1 0 2. Trigonometry.

3 2 1 0 3. Differential and integral calculus.

3 2 1 0 4. Probability and statistics.

3 2 1 0 5. Simple computer programming.

E. Take courses in:

3 2 1 0 1. Humanities.

3 2 1 0 2. Social sciences.

3 2 1 0 3. Engineering and technology.

III. Nature of Science in Historical, Philosophical and Social Perspective

The program provides regular opportunities for pre-service science teachers to:

3 2 1 0 (2) A. Take courses in the history and philosophy of science.

3 2 1 0 (1 1) B. Study interrelationships among science, technology and society.

3 2 1 0 (2) C. Study various definitions of science.

3 2 1 0 (1) (1) D. Study the methodologies, logical procedures and explanatory systems that characterize the natural sciences.

3 2 1 0 (1) E. Compare and differentiate among concepts, problems, data, interpretations, and the nature of evidence in the different science disciplines.

3 2 1 0 (1 1) F. See the power of a conceptual model for organizing thought about known phenomena (e.g., evolution in biology, kinetic-molecular model in chemistry).

3 2 1 0 (1) (1) G. Study examples which show how scientific ideas play a role in shaping a person's view of himself in the world (e.g., earth-centered cosmos vs. expanding universe or the contrast between evolutionary development and special creation).

3 2 1 0 (1 1) H. Read relevant publications such as:

1. Kuhn, T. The History of Scientific Revolutions.
2. Schwab, J. J. Enquiry, the Science Teacher and the Educator.
3. Connelly, et al. Science Enquiry and Science Instruction.

3 2 1 0 (1) I. Apply the analytical methods of science in multidisciplinary approaches to studying and solving societal problems.

3 2 1 0 (2) J. Discuss and develop goals and objectives for teaching science.

3 2 1 0 (1) K. Discuss and develop goals and objectives for teaching specific science disciplines.

IV. Objectives, Competencies and Instructional Skills

The program provides regular opportunities for pre-service science teachers to:

A. Acquire basic understandings in:

3 2 1 0 (1 1 1) 1. Learning and learning theories (Ausubel, Skinner, Gagne, et al.).

3 2 1 0 (1 1 2) 2. Developmental psychology (Piaget).

3 2 1 0 (2 1) 3. Different learning modes such as rote reception, discovery and inquiry (Ausubel, Bruner, Schwab).

3 2 1 0 (1 2) 4. Retention and transfer.

3 2 1 0 (1) (1 1) 5. Motivation.

B. Become knowledgeable about some of the major modern science curricula such as BSCS, ISIS, CHEMS, HPP, ESS, SCIS, SAPA, 5-13, ASEP, etc., by:

3 2 1 0 (1 2) 1. Reviewing selected units.

3 2 1 0 (2 1) 2. Teaching selected units.

C. Classify and develop educational objectives:

3 2 1 0 (1 3) 1. Cognitive domain.

3 2 1 0 (1) (1 1) 2. Affective domain.

3 2 1 0 (3) 3. Psychomotor domain.

3 2 1 0 (2 1) 4. Inquiry skills.

3 2 1 0 (3) D. Write performance objectives.

3 2 1 0 (1 1 1) E. Identify objectives in different lessons.

3 2 1 0 (1 2) F. Identify objectives in different curricula.

3 2 1 0 (1) (1 1) G. Analyze textbooks and other curriculum materials in terms of their educational philosophy, subject matter adequacy, conception of the nature of science, nature of laboratory activities, etc.

3 2 1 0 (1 2) H. Select and use resources suitable for achieving particular aims and goals.

3 2 1 0 (1 1 1) I. Select and use resources suitable for particular students.

J. Prepare and construct teaching materials such as:

3 2 1 0 (1 1 1) 1. Pictures.

3 2 1 0 (1 2) 2. Slides.

3 2 1 0 (1) (2) 3. Transpatencies.

3 2 1 0 (2) (1) 4. Audiotapes.

3 2 1 0 (2) (1) 5. Three-dimensional models.

3 2 1 0 (1 1) (1) 6. Simple apparatus.

3 2 1 0 (1 2) 7. Tape slide presentations.

K. Teach with:

3 2 1 0 (1) (1 1) 1. Pictures.

3 2 1 0 (1 1 1) 2. Slides.

3 2 1 0 (1 1 1) 3. Transparencies and television.

3 2 1 0 (1) (1 1) 4. Models.

3 2 1 0 (1 2) 5. Super 8 loops.

3 2 1 0 (1) (1 1) 6. Sixteen-mm. films.

3 2 1 0 (1 1 1) 7. Tape slide presentations.

3 2 1 0 (1 1 1) L. Acquire and use laboratory techniques and skills.

3 2 1 0 (1 2) M. Acquire and use field study techniques and skills.

3 2 1 0 (1) (1 1) N. Acquire and use communication skills.

O. Develop skills in laboratory safety including:

3 2 1 0 (1 2) 1. Practicing spotting safety hazards.

3 2 1 0 (1 1 1) 2. Identification of laboratory experiments requiring safety precautions.

3 2 1 0 (1) (2) 3. Becoming familiar with school emergency procedures, safety regulations and safety recommendations.

3 2 1 0 (1 1 1) 4. Avoiding experiments and activities that will endanger students.

3 2 1 0 (1) (2) 5. Making safety checks of a science laboratory, and correcting deficiencies.

3 2 1 0 (1 2) P. Team plan and team teach.

3 2 1 0 (3) Q. Improve teaching skills such as questioning techniques.

3 2 1 0 (2) (1) R. Improve problem solving and inquiry skills.

S. Participate in a variety of instructional situations including:

3 2 1 0 (2 1) 1. Meaningful laboratory lessons.

3 2 1 0 (2) (1) 2. Class discussion.

3 2 1 0 (2) (1) 3. Small group activities.

3 2 1 0 (1 1 1) 4. Field trips and other out-of-school activities.

3 2 1 0 (3) 5. Extended periods of outdoor camping.

3 2 1 0 (1 1) (1) 6. Narrative of inquiry.

3 2 1 0 (1 1) (1) 7. Invitations to inquiry.

3 2 1 0 (1 1 1) 8. Single topic inquiry films or slides.

3 2 1 0 (1) (2) 9. Analysis of original research papers (inquiry into inquiry).

3 2 1 0 (1 1 1) 10. Investigative laboratory activities.

3 2 1 0 (3) 11. Student research projects.

3 2 1 0 (1 2) 12. Activities promoting creativity and divergent thinking and exploration.

3 2 1 0 (1) (1 1) 13. Activities that promote the application of knowledge and skill to real world problems.

3 2 1 0 14. _____

3 2 1 0 15. _____

V. Communication and Interpersonal Relations

The program provides regular opportunities for pre-service teachers to:

3 2 1 0 (1) A. Suggest ideas and activities which are seriously considered and utilized.

3 2 1 0 (1) B. Study and work in an atmosphere conducive to spontaneity, creative thinking, intellectual honesty and trust.

3 2 1 0 (1) C. Utilize various modes of instruction most suited to individual student needs and modify the structure in order to develop student self confidence and independence.

3 2 1 0 (1) D. Attend to what students say and how they say it.

3 2 1 0 (1) E. Attend to what students write and how they write it.

3 2 1 0 (1) F. Attend to the effect of teaching style on student learning, thinking, and attitudes.

3 2 1 0 (1) G. Be sensitive to student needs, feelings, and backgrounds.

3 2 1 0 (1) H. Estimate student skills and abilities (manipulative, intellectual, etc.).

3 2 1 0 (2) I. Identify the approximate level of intellectual development of children in terms of Piagetian stages of development.

3 2 1 0 (1 1) J. Interview individual students to obtain different kinds of information about them.

3 2 1 0 (1) K. Help students in their individual projects.

3 2 1 0 (1) L. Facilitate student involvement in different activities in the classroom.

3 2 1 0 (1) M. Maintain trustful and friendly relations with students.

3 2 1 0 (2) N. Deal with simulated critical incidents involving a variety of situations and different kinds of students.

3 2 1 0 (1) O. Establish and maintain discipline.

3 2 1 0 (1) P. Motivate and interest students.

3 2 1 0 (1 1) Q. Observe and record student-teacher interactions.

VI. Experiences in Teaching

The program provides regular opportunities for pre-service teachers to:

3 2 1 0 (2 2) A. Observe and teach students in an elementary school.

3 2 1 0 (3) B. Observe and teach students in grades 7-9.

3 2 1 0 (3) C. Observe and teach students in grades 10-12.

3 2 1 0 (2 1) D. Observe and teach students with a wide range of intelligence and aptitude.

3 2 1 0 (2 1) E. Observe and teach students with a wide range of interests and career goals.

3 2 1 0 (3) F. Observe and teach students individually.

3 2 1 0 (1) (1 1) G. Observe and teach students in small groups.

3 2 1 0 (2 1) H. Observe and teach students in large groups.

3 2 1 0 (3 1) I. Practice and improve specific teaching skills with students in the classroom.

3 2 1 0 (2 1) J. Individualize instruction.

3 2 1 0 (1 1 1) K. Organize and teach a self-paced course utilizing:

3 2 1 0 (2 1) 1. Audiotutorial materials.

3 2 1 0 (1) (1 1) 2. Programmed learning materials.

3 2 1 0 (2 1) 3. Keller plan or similar management system.

3 2 1 0 (1 2) 4. Open space classroom.

3 2 1 0 (1) L. Manage multimedia instruction.

3 2 1 0 (1) (2) M. Select and use teaching strategies suitable for particular goals, in a particular school environment with particular students.

3 2 1 0 (1) (2) N. Analyze lesson plans for achieving particular goals in a particular school environment with particular students.

3 2 1 0 (1 1 1) O. Prepare lesson plans for achieving particular goals in a particular school environment with particular students.

3 2 1 0 (2 1) P. Microteach the planned lesson, obtain feedback and suggest modifications.

3 2 1 0 (2 1) Q. Teach the planned lesson in school, obtain feedback and suggest modifications.

3 2 1 0 (1 1 1) R. Analyze a unit or a module in terms of achieving particular goals in a particular school environment with particular students.

3 2 1 0 (1 1 1) S. Prepare a unit or a module for achieving particular goals in a particular school environment with particular students.

3 2 1 0 (1 1 1) T. Microteach the unit or module, obtain feedback and suggest modifications.

3 2 1 0 (1 1 1) U. Teach the unit or module in school, obtain feedback and suggest modifications.

3 2 1 0 (1 2) V. Experience the need to modify objectives as the instructional process proceeds.

3 2 1 0 (1 2) W. Participate in school faculty meetings.

3 2 1 0 (1 2) X. Participate in PTA meetings.

3 2 1 0 (1 2) Y. Participate in extracurricular school activities.

3 2 1 0 (2 1) Z. Lead a field trip.

3 2 1 0 (1 2) AA. Participate as an instructor in an outdoor camp.

VII. Evaluation and Application of Research

The program provides regular opportunities for pre-service teachers to:

3 2 1 0 (2) (1) A. Discuss the purposes and limitations of testing.

3 2 1 0 (1 1 1) B. Discuss the advantages and disadvantages of different types of tests in terms of validity, reliability and useability.

3 2 1 0 (1 1 1) C. Write test items to assess particular objectives.

3 2 1 0 (3) D. Carry out an item analysis.

3 2 1 0 (3) E. Analyze tests in terms of format, cognitive levels, validity and reliability.

3 2 1 0 (1 2) F. Experience and administer an open book test.

3 2 1 0 (2) (1) G. Experience and administer a laboratory practical test.

3 2 1 0 (3) H. Experience "analysis of scientific research" test.

3 2 1 0 (2) (1) I. 1. Design a pretest and posttest for a particular instructional unit.

3 2 1 0 (2) (1) 2. Administer the pretest and posttest for that unit.

3 2 1 0 (1) (1 1) 3. Evaluate the test instruments and the instructional unit.

3 2 1 0 (1 2) J. Conduct a posttest class discussion.

3 2 1 0 (3) K. Obtain and interpret results of standardized tests.

3 2 1 0 (2 1) L. Design, administer, and evaluate some instruments which assess student interests and attitudes.

3 2 1 0 (3) M. Obtain feedback from students' behavior in class.

3 2 1 0 (1 1) (1) N. Observe and analyze the teaching of experienced teachers.

3 2 1 0 (2 1) O. Make and analyze audiotapes and videotapes of lessons using a number of interaction analysis systems.

3 2 1 0 (2 1) P. 1. Contract to change or develop a specific personal skill in teaching utilizing audiotapes and interaction analysis.

3 2 1 0 (2 1) 2. Change or develop the skill in accord with contract.

3 2 1 0 (1) (2) Q. Report what research says about learning and demonstrate how research results can be applied in the teaching of science.

3 2 1 0 (1 2) R. Design and conduct a research study with students on the effects of instruction.

3 2 1 0 (2 1) S. Participate in the evaluation of the teacher education program.

VIII. Continuous Professional Growth

The program provides regular opportunities for pre-service teachers to:

3 2 1 0 (2) A. Observe the teaching of experienced teachers, analyze their teaching and model appropriate behavior.

3 2 1 0 (2) B. Make audiotapes or videotapes of real teaching episodes and analyze them with the aid of an instructor and/or an interaction analysis system.

3 2 1 0 (1 1) C. Make appraisal of their own teaching and attitudes toward students.

D. Solicit thoughtful feedback on teaching from:

3 2 1 0 (2) 1. Peers.

3 2 1 0 (1) (1) 2. Students.

3 2 1 0 (1 1) E. Become familiar with the professional services that are normally provided by the schools.

3 2 1 0 (1) (1) F. Participate in simulations requiring professional decision making.

3 2 1 0 (1 1) G. Study in an atmosphere conducive to independent self-directed learning.

3 2 1 0 (1) (1) H. Become student members of a professional association.

3 2 1 0 (1) (1) I. Read professional journals in science.

3 2 1 0 (1) (1) J. Read professional journals in science education.

3 2 1 0 (1) (1) K. Carry out limited research in science.

3 2 1 0 (2) L. Carry out limited research in science education.

3 2 1 0 (1 1) M. Participate in professional conferences.

3 2 1 0 (2) N. Contribute papers to professional conferences.

3 2 1 0 (2) O. Participate in courses and workshops for in-service teachers.

3 2 1 0 (1 1) P. Assume many roles in the teaching-learning environment including group leader, group participant, resource person, listener, and experienced investigator.

3 2 1 0 (1 1) Q. Evaluate their own progress in the teacher education program.

IX. Assessment of Skills and Program Evaluation

A. The program provides regular opportunities for pre-service teachers to:

3 2 1 0 (2) 1. Identify personal educational objectives.

3 2 1 0 (1) (1) 2. Participate in planning their own program.

3 2 1 0 (2) 3. Evaluate their own program.

3 2 1 0 (1 1) 4. Receive continuous feedback on their program.

3 2 1 0 (2) 5. Criticize the program.

3 2 1 0 (1) (1) 6. Make suggestions to improve the program.

3 2 1 0 (1 1) 7. Evaluate performance and progress of their peers.

3 2 1 0 (1 1) 8. Evaluate the effectiveness of their courses and assignments.

3 2 1 0 (1 1) 9. Evaluate the effectiveness of their instructors.

B. Instruction is based upon:

3 2 1 0 (1 1) 1. The needs and intetests of individual pre-service teachers.

3 2 1 0 (1 1) 2. The individual behaviors of individual pre-service teachers.

C. Individual evaluation is based upon:

3 2 1 0 (1 1) 1. Progress during the program.

3 2 1 0 (1 1) 2. Attainment of specified competencies.

3 2 1 0 (1) (1) 3. End-of-course performance in comparison with peers.

3 2 1 0 (2) 4. Long-term (at least one year after graduation) performance.

D. Competence is assessed on the basis of:

3 2 1 0 (2) 1. Written examination.

3 2 1 0 (1) (1) 2. Written reports and papers.

3 2 1 0 (1 1) 3. Projects.

3 2 1 0 (1 1) 4. Performance in class.

3 2 1 0 (1) 5. Teaching skills.

3 2 1 0 (1 1) 6. Teaching behaviors.

3 2 1 0 (1 1) 7. Personality inventories.

3 2 1 0 (1 1) 8. Attitude inventories.

3 2 1 0 (2) 9. Reports provided by cooperating teachers.

3 2 1 0 (1 1) 10. Reports provided by university supervisors.

3 2 1 0 (1 1) 11. Self evaluation.

3 2 1 0 (1 1) 12. Peer evaluation.

E. Program evaluation is based on data provided by:

3 2 1 0 (2) 1. Pre-service teachers.

3 2 1 0 (2) 2. Cooperating principals.

3 2 1 0 (1 1) 3. Cooperating teachers.

3 2 1 0 (1 1) 4. Cooperating students in the schools.

3 2 1 0 (1) (1)	5.	Quality of performance.
3 2 1 0 (2)	6.	Results of examinations.
3 2 1 0 (1 1)	7.	External professionals.
3 2 1 0 (1 1)	8.	Enrollment fluctuations.
3 2 1 0 (2)	9.	Instructional staff.
3 2 1 0 (1 1)	10.	Specially designed evaluation instruments.
3 2 1 0 (1) (1)	11.	On-the-job performance of program graduates.
3 2 1 0 (2)	12.	Specially designed studies, including comparative studies.

Over the past years, the role of the teacher as a transmitter of knowledge has been evolving. Teachers are now presumed to fulfill a variety of roles requiring a variety of competencies. Schools, students, teachers, the social milieu, and our views on a wide range of issues relevant to teaching and learning have also changed. These changes are reflected in various ways in teacher education programs.

The purpose of this paper has been to identify recent trends in the education of science teachers and to develop an assessment inventory that would facilitate communication and change. Nine principles describing new directions have been delineated and used as a basis for developing the STEP Inventory. The STEP Inventory has been designed to facilitate dialogue among science teacher educators. The Inventory should be of value in describing and evaluating individual teacher education programs. It should also be helpful in the effort to develop more explicit objectives for teacher education. Science educators are urged to use the STEP Inventory in the examination of their own programs and in reporting them publicly. Individuals may wish to modify the instrument and to further elaborate specific sections to make the Inventory a more useful communications medium.

REFERENCES

1) Atwood, Ronald K., "Elements of Science Teacher Education as Abstracted from the ERIC-AETS: In Search of Promising Practices in Science Teacher Education", paper presented at 1974 AETS annual meeting.

2) Bruner, Jerome, "The Process of Education Revisited", Phi Delta Kappan, 1971, 53, 18-21.

3) Capie, William, ed., "Science Teacher Education 1974: Issues and Positions", 1975 AETS Yearbook, ERIC Information Analysis Center for Science, Mathematics and Environmental Education. Columbus: Ohio State University, December, 1975.

4) Fox, Fred W., ed., "Science Teacher Education 1974: Issues and Positions", 1975 AETS Yearbook, ERIC Information Analysis Center for Science, Mathematics and Environmental Education. Columbus: Ohio State University, October, 1974.

5) "In Search of Promising Practices in Science Teacher Education", ERIC Information Analysis Center for Science, Mathematics and Environmental Education. Columbus: Ohio State University, March 30, 1973.

6) Meyer, R., "Development of the Training and Retraining of School Biology Teachers", paper presented at the International Congress on the Improvement of Biology Education, Upsala, Sweden, September, 1975.

7) National Science Teachers Association, Guidelines for Self-Assessment of Secondary School Science Programs. Washington, D. C., 1975.

8) Newton, David E., and Fletcher G. Watson, "The Research on Science Education Survey: The Status of Teacher Education Programs in the Sciences, 1965-1967", Harvard Graduate School of Education, 1968.

9) Ost, David H., ed., "Guidelines and Standards for the Education of Secondary School Teachers of Science and Mathematics", AAAS Miscellaneous Publication 71-9. Washington, D. C.: American Association for the Advancement of Science, 1971.

10) Tamir, Pinchas, "The Iowa-UPSTEP Program in International Perspective", Technical Report 9, Science Education Center, The University of Iowa, March, 1976.

SUMMARY OBSERVATION REPORTS

FOR

CURRENT UPSTEP GRADUATES

1977-1978

OR STUDENT TEACHING

Observer: _____ Class & topic: Physics Time in: ____ Time out: ____

Checklist	+ = appropriate - = inappropriate
[redacted]ication skills	
Verbal	
Voice tone +	Voice variation —
Voice volume +	
[redacted]verbal	
[redacted]nds	Eye contact +
Facial expression +	Movement +
[redacted]ture +	
[redacted]patibility of verbal and nonverbal	
[redacted]nguage -- oral	
Vocabulary selection +	Projection +
[redacted]nunciation +	Correct usage +
[redacted]nguage -- written	
Handwriting	Spelling —
Clarity	Grammar +
[redacted] Layout	
[redacted]uestioning	
Levels	Form
Probing	Prompting
[redacted]directing	Chaining
[redacted]using/wait-time	Accepting student ideas
Using student ideas	Handling student questions
Distribution	
[redacted]inforcement	
[redacted]ovisual materials	
Chalkboard	Slides
Overhead projector	Film strips
[redacted]tion pictures	Other
[redacted]personal skills	
Teacher-student rapport +	
[redacted]m	Cooperative +
[redacted]cepting +	Trusting +
[redacted]couraging +	Engaging +
Flexible +	Open +
[redacted]olite	
[redacted]onal qualities	
Enthusiasm +	Emotional control +
Sincerity +	Forcefulness ?
[redacted]se of humor + has not had enough experience to discipline but all critical teaching qualities	
[redacted]paration	
[redacted]ontent background	
[redacted]cific to science + topic	Education-related knowledge
General knowledge +	
[redacted]anning (no written plans to rate)	
[redacted]ls/objectives +	Follow-up +
[redacted]erials	Evaluation plan +
Introduction +	Safety considerations
Activities	
[redacted]son performance. Phrases up	
[redacted]troduction (no written plans)	
Motivation +	Safety precautions
[redacted]blem focus +	Prerequisite skills
[redacted]rections +	Clarity
[redacted]ctivities (no written plans)	
Organization	Management —
[redacted]ntrol —	Care of equipment and facilities
[redacted]pervision	
[redacted]llow-up	
Closure	Synthesizing
[redacted]ring	Applying
[redacted]terpreting	Homework
[redacted]valuation	
Compatible with [redacted]/objectives +	Variety of sources
[redacted] to students +	Return time + Exactness
[redacted] parents +	Interpretation of data

Comments

was placed in Physics classes at Iowa City West High School. The classes were self-paced using Project Physics materials. took full responsibility for grading homework and tests for three physics classes from the second week of student teaching until the final day. He also assisted with an electronics class which was self-paced. During class time Ron made himself available to answer questions and to assist students with problems and set up of laboratories. developed an optional activity about astronomy and made himself available evenings to groups and individuals to perform some telescope observations.

In the middle of his student teaching experience, worked for two weeks with an earth science class of He presented an astronomy section to a group of slower students. An activity he used was to have the students develop plans for a lunar colony. This was prepared for by movies and discussions of factors to consider.

Evaluative comment and summary:

is considered by and to be knowledgeabl and of having the potential to be a very good teacher. He needs to have some more experience in dealing with slower groups of students.

FOR STUDENT TEACHING | Observer: _____ Class & topic: Chemistry Time in: ____ Time out: ____

Checklist (+ = appropriate, − = inappropriate)	
Communication skills	
Verbal	
Voice tone +	Voice variation
Voice volume +	
Nonverbal	
Attitude +	Eye contact +
Facial expression +	Movement +
Posture +	
Compatibility of verbal and nonverbal	
Language -- oral	
Vocabulary selection +	Projection +
Pronunciation +	Correct usage +
Language -- written	
Handwriting	Spelling +
Clarity +	Grammar +
Layout +	
Questioning	
Levels +	Form
Probing +	Prompting +
Redirecting +	Chaining
Pausing/wait-time	Accepting student ideas
Using student ideas	Handling student questions
Distribution	
Reinforcement	
Audiovisual materials	
Chalkboard +	Slides
Overhead projector +	Film strips
Motion pictures	Other
Interpersonal skills	
Teacher-student rapport --	
Warm	Cooperative
Accepting	Trusting
Encouraging	Engaging
Flexible	Open
Polite +	
Personal qualities	
Enthusiasm −	Emotional control
Sincerity +	Forcefulness
Sense of humor −	
Preparation	
Content background	
Specific to science topic +	Education-related knowledge +
General knowledge +	
Planning	
Goals/objectives +	Follow-up +
Materials +	Evaluation plan +
Introduction +	Safety considerations
Activities	
Lesson performance	
Introduction	
Motivation	Safety precautions +
Problem focus +	Prerequisite skills +
Directions +	Clarity
Activities	
Organization	Management −
Control −	Care of equipment and facilities +
Supervision	
Follow-up	+
Closure	Synthesizing
Sharing	Applying
Interpreting	Homework
Evaluation	
Compatible with +	Variety of sources
Goals/objectives	Return time +
Feedback to students	Interpretation of data +
Parents +	

Comments

was a half-time student teacher in Chemistry with as cooperatin teacher at Iowa City West High Schoo She had primary responsibility for two chemistry classes, wrote and used several laboratory exercises. One of them dealt with combining numbers of atoms to make molecules and another dealt with precipitate formation.

also student taught in mathematics half-time with taught a geometry and an algebra class.

chemistry classes consisted of lectures, problem solving, and laboratory exercises. The text for the course was Chemistry by Toon, et. al.

ability to relate to students as individuals is a problem.

Strongest area - very well prepared

Evaluative comment and summary:

had particular difficulty w/one group in her 3rd hour class —

is very strong in background and preparation. She was unable to establish rapport with her students and many times had outside interests that were more important than teaching.

215

Excellent | Satisfactory | Unsatisfactory

FOR STUDENT TEACHING | Observer: _____ Class & topic: Intro. Biology Time in: ____ Time out: ____ Date: 12/2/77

Checklist (+ = appropriate, − = inappropriate)	
Communication skills	
Verbal: [illegible]	
Voice tone [illegible]	Voice variation +
Voice volume [illegible]	
Nonverbal	
Hands	Eye contact +
Facial expression +	Movement +
Posture +	
Compatibility of verbal and nonverbal	
Language -- oral	
Vocabulary selection +	Projection +
Pronunciation −	Correct usage +
Language -- written	
Handwriting +	Spelling + (most)
Clarity +	Grammar OK
Layout +	
Questioning	
Levels +	Form
Probing +	Prompting +
Redirecting +	Chaining
Pausing/wait-time	Accepting student ideas +
Using student ideas +	Handling student questions +
Distribution +	
Reinforcement +	
Audio/visual materials	
Chalkboard +	Slides +
Overhead projector +	Film strips +
Motion pictures +	Other
Interpersonal skills	
Teacher-student rapport +	
Warm +	Cooperative +
Accepting +	Trusting +
Encouraging +	Engaging +
Flexible +	Open +
Polite +	
Personal qualities	
Enthusiasm +	Emotional control +
Sincerity +	Forcefulness +
Sense of humor +	
Preparation	
Content background	
Specific to science topic +	Education-related knowledge +
General knowledge +	
Planning	
Goals/objectives +	Follow-up +
Materials +	Evaluation plan +
Introduction +	Safety considerations ?
Activities	
Session performance	
Introduction	
Motivation +	Safety precautions
Problem focus +	Prerequisite skills
Directions +	Clarity
Directing	
Organization +	Management +
Control +	Care of equipment and facilities +
Supervision	
Follow-up	
Closure +	Synthesizing
Stating	Applying
Interpreting	Homework
Evaluation	
Compatible with goals/objectives +	Variety of sources
	Return time +
[illegible] to students +	Interpretation of data +
[illegible] parents +	

Comments

(please see below handwriting)

sometimes problems w/ Biology vocabulary

sometimes will rephrase a question before giving student chance to answer.

was placed with in his introductory Biology classes at Iowa City West High School. was allowed to design her own laboratory experiments and present lecture material by her own methods after consultation with She tried a variety of approaches to experiments. In one she posed a problem and allowed the students to design ways to solve the problem with materials available in the laboratory room.

was also concerned with her habit of saying OK and with not asking open-ended questions at appropriate times. She worked hard to eliminate the excessive OK's and was successful in doing this. The open-ended questioning technique still needs some work.

High points

does not get out of shape but preparation trivial problems

Evaluative comment and summary:

is acknowledged by her cooperating teacher and other visitors to be a very warm and interested teacher. She should be a very good teacher.

FOR STUDENT TEACHING | Observer: _____ Class & topic: Intro. Biology & Genetics Time in: _____ Time out: _____

Checklist (+ = appropriate, − = inappropriate)		Comments
[illegible]ication skills		student taught at Cedar Rapids Washington High School. She was assigned to as a cooperating teacher. The first semster taught Introductory Biology classes and the time she was there the second semester, she taught Genetics classes. The Introductory Biology classes were organized according to departmental objectives for each unit and departmental tests for each section. The teachers in the Biology department, including the student teachers, determine these objectives and designed tests at numerous meetings throughout the first semester.
Verbal	[illegible]	
Voice tone −	Voice variation	
Voice volume +	Could [illegible]	
Nonverbal		
Hands	Eye contact	
Facial expression −	Movement +	
Posture	[illegible]	
Compatibility of verbal and nonverbal		
Language -- oral		On Labor Day was thrown from a horse which caused her to miss many days of school during the next few weeks. This contributed to difficulties she had with most of her classes during the first semester. The time she was there during the second semester went better but it, too, was not without some difficulties. There were also some conflicts with the cooperating teacher over style of teaching, methods of presentation, scope, and pacing of material.
Vocabulary selection	Projection	
Pronunciation	Correct usage	
Language -- written		
Handwriting =	Spelling	
Clarity +	Grammar +	
Layout +		
Questioning		
Levels	Form	
Probing	Prompting	
Redirecting	Chaining	
Pausing/wait-time	Accepting student ideas	
Using student ideas	Handling student questions	
Distribution		
Reinforcement		
Audiovisual materials		
Chalkboard	Slides	Cannot the machines available not have them well coordinated w/materials presentation
Overhead projector	Film strips	
Motion pictures	Other	
Interpersonal skills		
Teacher-student rapport		
Warm +	Cooperative	
Accepting	Trusting +	
Encouraging +	Engaging	
Flexible	Open +	
Polite +	Projects concern for students	
Personal qualities		
Enthusiasm	Emotional control	
Sincerity	Forcefulness	
Sense of humor		
Preparation		
Content background		needs to beef up background - has narrow biology background
Specific to science topic −	Education-related knowledge	
General knowledge −		
Planning		
Goals/objectives	Follow-up	
Materials	Evaluation plan	
Introduction	Safety considerations	
Activities		
Classroom performance		
Introduction		improved toward end of teaching experience
Motivation +	Safety precautions	
Problem focus +	Prerequisite skills +	
Directions	Clarity	
Activities		
Organization +	Management −	
Control −	Care of equipment and facilities ?	
Supervision		
Follow-up		
Closure	Synthesizing	
Stating	Applying	
Interpreting	Homework	
Evaluation		
Compatible with + goals/objectives	Variety of sources	
Return to students	Return time +	
Parents +	Interpretation of data +	

Evaluative comment and summary:

is marginally satisfactory. She has potential to be a good teacher. She needs some positive experiences working with colleagues.

needs much work in this area.

...OR STUDENT TEACHING | Observer: _____ | Class & topic: Intro. Biology | Time in: _____ | Time out: _____

Checklist (+ = appropriate, − = inappropriate)	
...ication skills	
Verbal	
Voice tone +	Voice variation
Voice volume +	
Nonverbal	
Hands +	Eye contact +
Facial expression +	Movement +
Posture +	
Compatibility of verbal and nonverbal	
Language -- oral	
Vocabulary selection +	Projection +
Pronunciation +	Correct usage
Language -- written	
Handwriting	Spelling
Clarity +	Grammar
Layout +	
Questioning	
Levels +	Form
Probing +	Prompting
Redirecting	Chaining
Pausing/wait-time	Accepting student ideas +
Using student ideas	
Distribution +	Handling student questions +
Reinforcement +	
Audio-visual materials	
Chalkboard +	Slides
Overhead projector +	Film strips +
Motion pictures +	Other
Interpersonal skills	
Teacher-student rapport +	
Warm +	Cooperative +
Accepting +	Trusting +
Encouraging +	Engaging +
Flexible +	Open +
Polite +	
Personal qualities	
Enthusiasm +	Emotional control +
Sincerity +	Forcefulness +
Sense of humor +	
Preparation	
Content background	
Specific to science topic −	Education-related knowledge −
General knowledge −	
Planning	
Goals/objectives +	Follow-up +
Materials +	Evaluation plan +
Introduction +	Safety considerations
Activities	
Lesson performance	
Introduction	
Motivation +	Safety precautions +
Problem focus +	Prerequisite skills +
Directions +	Clarity
Activities	
Organization +	Management +
Control +	Care of equipment + and facilities
Supervision	
Follow-up	
Closure +	Synthesizing
Ordering	Applying
Interpreting	Homework
Evaluation	
Compatible with + goals/objectives	Variety of sources
Feedback to students +	Return time +
Parents +	Interpretation of data +

→ strongest area

→ needs to beef up content knowledge

Comments

student taught at Cedar Rapids Washington High School. was his cooperating teacher. . taught Introductory Biology classes both the first semester and for as long as he was at Washington during the second semester. The introcutory biology classes were organized with departmental objectives for each unit of instruction and department wide tests for each section.

The teachers in the biology department, including the student teachers, met often to define objectives and design tests. participated in all of these meetings.

Note should be made of the enthusiasm with which tackled this assignment. He volunteered his services to help on a field trip the semester prior to his student teaching and helped with coaching football during the summer.

Evaluative comment and summary:

has a good personality, is cooperative and willing to learn, and is able to make adjustments to things which originally he found frustrating.

[redacted] STUDENT TEACHING | Observer: _____ Class & topic: Biology Time in: ____ Time out: ____

Checklist	+ = appropriate – = inappropriate	Comments
Communication skills		usually has very interesting classes. They are well-res researched and well executed. He has tried a variety of strategies and handled them all very well. He is not afraid to tackle classroom problems immediately and with appropriat action. has an abundance of self-confidence and this ha enabled him to handle several very tough situations which occurred in the study hall that he proctored. On two occasi he talked down situations which could have become racial inci dents. In his last few weeks of student teaching, has run his classes with students doing individualized projects concerning pollution. Students which hadn't been involved all year, except as troublemakers, were actively participating in some of the available activities.
Verbal	+	
Voice tone	Voice variation	
Voice volume talks too fast		
Nonverbal	+	
Hands	Eye contact	
Facial expression	Movement	
Posture		
Compatibility of verbal and nonverbal	+	
Language -- oral	+	
Vocabulary selection	Projection	
Pronunciation	Correct usage	
Language -- written	+	
Handwriting	Spelling	
Clarity	Grammar	
Layout		
Questioning	+	
Levels	Form	
Probing	Prompting	
Redirecting	Chaining	
Pausing/wait-time	Accepting student ideas	
Using student ideas		
Distribution	Handling student questions	
Reinforcement		
Audiovisual materials	+	
Chalkboard	Slides	
Overhead projector	Film strips	
Motion pictures	Other	
Interpersonal skills		
Teacher-student rapport	+	
Warm	Cooperative	
Accepting	Trusting	
Encouraging	Engaging	
Flexible	Open	
Polite		
Personal qualities	+	
Enthusiasm	Emotional control	
Sincerity	Forcefulness	
Sense of humor Excellent		
Preparation		
Content background	+	
Specific to science topic	Education-related knowledge	
General knowledge		
Planning	+	
Goals/objectives	Follow-up	
Materials	Evaluation plan	
Introduction	Safety considerations	
Activities		
Classroom performance		
Introduction	+	
Motivation	Safety precautions	
Problem focus	Prerequisite skills	
Directions	Clarity	
Activities	+	
Organization	Management	
Control	Care of equipment and facilities	
Supervision		
Follow-up	+	
Closure	Synthesizing	
Hearing	Applying	
Interpreting	Homework	
Evaluation	+	
Compatible with goals/objectives	Variety of sources	
Feedback to students	Return time	
Reports to parents	Interpretation of data	

Evaluative comment and summary:

will make an excellent teacher. He has confidence in what he does and who he is. He is unafraid to face up to situations which are potentially dangerous. He has a fine sense of humor. He is a tremendous prospect.

Observer: _____ Class & topic: Biology _____ Time in: _____ Time out: _____

Checklist (+ = appropriate, – = inappropriate)	
Communication skills	
Verbal	OK
Voice tone	Voice variation
Voice volume +	Confidence
Nonverbal (much improvement)	OK
Hands	Eye contact
Facial expression	Movement
Posture	
Compatibility of verbal and nonverbal	OK
Language -- oral	OK
Vocabulary selection	Projection
Pronunciation	Correct usage
Language -- written	OK
Handwriting	Spelling
Clarity	Grammar
Layout	
Questioning (need much improvement)	+
Levels low	Form
Probing not much	Prompting
Redirecting –	Chaining
Pausing/wait-time –	Accepting student ideas ?
Using student ideas –	
Distribution –	Handling student questions +
Reinforcement	
Audiovisual materials	OK
Chalkboard	Slides
Overhead projector	Film strips
Motion pictures	Other
Interpersonal skills	
Teacher-student rapport	OK
Warm	Cooperative
Accepting	Trusting
Encouraging	Engaging
Flexible	Open
Polite	
Personal qualities (needs improvement)	
Enthusiasm –	Emotional control
Sincerity	Forcefulness –
Sense of humor –	Needs a course in assertiveness
Preparation	
Content background	+
Specific to science topic	Education-related knowledge
General knowledge	
Planning	+
Goals/objectives	Follow-up
Materials	Evaluation plan
Introduction	Safety considerations
Activities	
Classroom performance	
Introduction	OK
Motivation –	Safety precautions
Problem focus	Prerequisite skills
Directions +	Clarity
Activities	OK
Organization	Management –
Control	Care of equipment and facilities
Supervision –	
Follow-up	OK
Closure	Synthesizing
Sharing	Applying
Interpreting	Homework
Evaluation	OK
Compatible with goals/objectives	Variety of sources
Feedback to students	Return time
Reports to parents	Interpretation of data

Comments

content background and planning are his two strongest areas. He is always well prepared for a class and has thoroughly researched the topic he is presenting.
In general, lectures and does not present much variety in his teaching approaches. He has spent most of this semes becoming comfortable with the role of the teacher and has nc had time to try out any new teaching strategies. Another concern of 's has been classroom management, in which is slowly becoming more skilled. He still needs more experi with management in order to be more effective.

Evaluative comment and summary:

Based on five visits and many conversations, I would say that Dave could become and adequate teacher, if given time and a positive environment in which to learn.

Excellent Satisfactory (✓)

Observer: _____ Class & topic: Meteorology Time in: _____ Time out: _____

Checklist	+ = appropriate - = inappropriate	Comments
[illegible]cation skills		brings much enthusiasm and talent to his classes. He prepares and plans extremely thoroughly. He is very seld caught without a backup plan. He reacts well to classroom disturbances from outside sources, such as the p.a. or assem blies which dirupt a class. He works well using different teaching strategies. His discussion and questioning techniq were initially weak but improved tremendously over the semes ter. He still needs a little work in tha[illegible]a. He also involved himself in extracurricular activities. He helped the choral director with background work prior to several pr sentations.
V[illegible]al	+	
[illegible]oice tone	Voice variation	
Voice volume		
N[illegible]verbal	+	
[illegible]nds	Eye contact	
Facial expression	Movement	
Posture		
C[illegible]patibility of verbal and nonverbal	+	
L[illegible]guage -- oral	+	
Vocabulary selection	Projection	
[illegible]nunciation	Correct usage	
L[illegible]guage -- written	+	
[illegible]ndwriting	Spelling	
Clarity	Grammar	
[illegible]Layout - board very cluttered		
Q[illegible]stioning	ICK	
[illegible]evels	Form	
Probing	Prompting	
[illegible]directing —	Chaining	
[illegible]using/wait-time —	Accepting student ideas —	
[illegible]ing student ideas		
Distribution	Handling student questions	
[illegible]inforcement		
A[illegible]diovisual materials	+	
Chalkboard	Slides	
Overhead projector	Film strips	
[illegible]tion pictures	Other	
[illegible]terpersonal skills		
Teacher-student rapport	+	
[illegible]orm	Cooperative	
[illegible]ccepting	Trusting	
[illegible]ncouraging	Engaging	
Flexible	Open	
Polite		
Pe[illegible]sonal qualities	+	
[illegible]nthusiasm	Emotional control	
Sincerity	Forcefulness	
[illegible]ense of humor — Excellent		
[illegible]paration		
Content background	+	
[illegible]pecific to science topic	Education-related knowledge	
General knouledge		
Planning	+	
[illegible]als/objectives	Follow-up	
[illegible]terials	Evaluation plan	
Introduction	Safety considera-tions	
Activities		
[illegible]sroom performance		
[illegible]troduction	+	
Motivation	Safety precautions	
Problem focus	Prerequisite skills	
[illegible]rections	Clarity	
[illegible]ctivities	+	
Organization	Management	
Control	Care of equipment and facilities	
[illegible]upervision		
Follow-up	+	
Closure	Synthesizing	
[illegible]sering	Applying	
[illegible]terpreting	Homework	
[illegible]valuation	+	
Compatible with [illegible]goals/objectives	Variety of sources	
[illegible]to students	Return time	
[illegible]arents	Interpretation of data	

Evaluative comment and summary:

will be an excellent teacher. He likes working with young adults. He also likes to try different approaches and is willing to try conventional strategies if they work.

Excellent

Observer: _____ Class & topic: Gr. 10 Science Time in: _____ Time out: _____

Checklist	+ = appropriate – = inappropriate
Communication skills	
Verbal	+
Voice tone +	Voice variation —
Voice volume +	
Nonverbal	+
Hands	Eye contact +
Facial expression +	Movement +
Posture	
Compatibility of verbal and nonverbal	+
Language -- oral	
Vocabulary selection +	Projection
Pronunciation	Correct usage
Language -- written	
Handwriting	Spelling +
Clarity	Grammar
Layout —	
Questioning	
Levels	Form —
Probing +	Prompting
Redirecting +	Chaining —
Pausing/wait-time —	Accepting student ideas
Using student ideas	Handling student questions
Distribution +	
Reinforcement	
Audio-visual materials	
Chalkboard	Slides
Overhead projector +	Film strips
Motion pictures	Other
Interpersonal skills	
Teacher-student rapport	
Warm	Cooperative +
Accepting +	Trusting
Encouraging	Engaging
Flexible	Open +
Polite	
Personal qualities	
Enthusiasm —	Emotional control +
Sincerity +	Forcefulness +
Sense of humor	
Preparation	
Content background	
Specific to science topic	Education-related knowledge
General knowledge	
Planning	—
Goals/objectives —	Follow-up
Materials	Evaluation plan
Introduction	Safety considerations
Activities	
Lesson performance	
Introduction	
Motivation	Safety precautions +
Problem focus	Prerequisite skills
Directions	Clarity
Activities	+
Organization	Management —
Control +	Care of equipment and facilities
Supervision +	
Follow-up	
Closure —	Synthesizing
Hearing	Applying
Interpreting	Homework
Evaluation	
Compatible with goals/objectives	Variety of sources
to students	Return time
Coherent —	Interpretation of data

Comments

Large group presentations were reasonably effective, but the individualized instruction lacked a degree of commitment. Generally, the lack of advance preparation and planning limited the teaching success below his potential. Lessons were planned well but generally just below the teaching time, so little extra consideration and alternatives were apparent. The lateness of final plans effected the acquisition of materials and support media.

Teacher-student rapport needs further consideration, students apparently considered to be distant and rigid. Lesson presentation lacked polish resulting from the questionable planning. Pre-lab, generally established attending behavior, control, problem focus and direction, but lacked consideration of student motivation. Laboratories were well supervised, but materials could have been better organized. Post-lab discussions attended to closure, but under-developed planning and questioning technique rendered this phase broken needs to attend to details in teaching, such as, student feedback, materials acquisition and management.

Evaluative comment and summary:

Performance indicated constant improvement, but lack of committment limited the success to a degree less than his potential.

Excellent Satisfactory Unsatisfactory

[R] STUDENT TEACHING | Observer: _____ Class & topic: Biology Time in: ____ Time out: ____

Checklist (+ = appropriate, - = inappropriate)		Comments
[C]ommunication skills		is knowledgable and prepared for his teaching. In spite of this, he is usually somewhat hesitant and unsure of himself. This was very evident initially but much less evident towards the end of the semester. He usually does a good job presenting his lessons and is willing to accept constructive criticism to improve his lesson. He is not afraid to tackle controversial subjects, even though he is not always sure how to tackle them or what his responses should be. Dave tried out a variety of strategies and showed a talent for being able to adapt to the needs of each strategy.
Verbal	OK	
Voice tone	Voice variation —	
[V]oice volume		
Nonverbal	+	
Hands	Eye contact	
Facial expression	Movement	
[P]osture		
Compatibility of verbal and nonverbal	+	
Language -- oral	+	
Vocabulary selection	Projection	
Pronunciation	Correct usage	
Language -- written	OK	
Handwriting	Spelling	
Clarity sometimes	Grammar	
Layout Seems satisfactory		
Questioning	OK	
Levels +	Form	
Probing +	Prompting	
Redirecting	Chaining	
Pausing/wait-time —	Accepting student ideas +	
Using student ideas	Handling student questions +	
Distribution +		
Reinforcement +		
Audiovisual materials needs work		
Chalkboard —	Slides	
Overhead projector —	Film strips	
Motion pictures	Other	
Interpersonal skills		
Teacher-student rapport	+	
Warm	Cooperative	
Accepting	Trusting	
Encouraging	Engaging	
Flexible	Open	
Polite		
Personal qualities	OK	
Enthusiasm	Emotional control	
Sincerity	Forcefulness	
Sense of humor —		
Preparation		
Content background	+	
Specific to science topic	Education-related knowledge	
General knowledge		
Planning	+	
Goals/objectives	Follow-up	
Materials	Evaluation plan	
Introduction	Safety considerations	
Activities		
Session performance		
Introduction	+	
Motivation	Safety precautions	
Problem focus	Prerequisite skills	
Directions	Clarity	
Activities	+	
Organization	Management	
Control	Care of equipment and facilities	
Supervision		
Follow-up	+	
Closure	Synthesizing	
Stating	Applying	
Interpreting	Homework	
Evaluation	+	
Compatible with goals/objectives	Variety of sources	
Feedback to students	Return time	
Records	Interpretation of data	

Evaluative comment and summary:

..will be a very good teacher. He is very interested in how students learn and what they learn. This enables him to find appropriate means to accomplish learning.

[redacted] STUDENT TEACHING | Observer: _____ | Class & topic: General Sci & Physics | Time in: _____ | Time out: _____

Checklist	+ = appropriate - = inappropriate	Comments
[redacted]location skills		
[redacted]ional	OK	. spent the first month of her student teaching handling two of general science classes and the remainder of the semester with two of physics classes. Her time with the general science classes was spent getting familiar with and comfortable with teaching. As a result, she did not try any methods other than lecturing or showing an occasional film or film strip. In physics classes she tried lecturing for a couple of weeks but became frustrated because she did not have enough background to deal wit students' questions. Many student were not paying attention to the lecture anyway. For the remainder of the semester she had the students work at their own pace on an assigned number of chapters with deadlines for assignments and tests. This seemed to work well for most students. (Note: did not turn in any audiotapes)
Voice tone	Voice variation	
Voice volume		
[redacted]verbal	OK	
[redacted]de	Eye contact	
Facial expression	Movement	
[redacted]ture		
[redacted]ibility of verbal and nonverbal	OK	
[redacted]uage -- oral	OK	
Vocabulary selection	Projection	
[redacted]nunciation	Correct usage	
[redacted]uage -- written	OK	
Handwriting	Spelling	
Clarity	Grammar	
[redacted]layout		
[redacted]tioning Needs improvement		
Levels low level	Form	
[redacted]obing not much	Prompting	
[redacted]irecting	Chaining	
[redacted]sing/wait-time	Accepting student ideas	
[redacted]ing student ideas		
[redacted]istribution limited	Handling student questions need much work	
[redacted]nforcement		
[redacted]visual materials	OK	
Chalkboard	Slides	
[redacted]rhead projector	Film strips	
[redacted]ion pictures	Other	
[redacted]rsonal skills		
[redacted]cher-student rapport	OK	
[redacted]	Cooperative	
[redacted]epting	Trusting	
[redacted]couraging	Engaging	
Flexible	Open	
[redacted]ality		
[redacted]nal qualities	OK	
Enthusiasm	Emotional control	
Sincerity	Forcefulness	
[redacted]se of humor		
[redacted]aration		
[redacted]ent background		
[redacted]ecific to science topic	Education-related knowledge	
General knowledge needs much work		
[redacted]ning	OK	
[redacted]ls/objectives	Follow-up	
[redacted]erials	Evaluation plan	
Introduction	Safety considerations	
[redacted]tivities		
[redacted]om performance		
[redacted]troduction	OK	
Motivation	Safety precautions	
[redacted]blem focus	Prerequisite skills	
[redacted]ections	Clarity	
[redacted]tivities	OK	
[redacted]rganization	Management	
[redacted]trol	Care of equipment and facilities	
[redacted]pervision		
[redacted]low-up	OK	
[redacted]nsure	Synthesizing	
[redacted]ring	Applying	
[redacted]erpreting	Homework	
[redacted]luation	OK	
[redacted]patible with objectives	Variety of sources	
[redacted] students	Return time	
[redacted]ents	Interpretation of data	

Evaluative comment and summary:

could be a good science teacher. She needs to become familiar with popular science magazines in order to expand her background of general knowledge. She also needs to get some variety in the science courses she takes.

[redacted] STUDENT TEACHING | Observer: _____ | Class & topic: Biology | Time in: ____ | Time out: ____

Checklist	+ = appropriate - = inappropriate
[redacted]ication skills	
Verbal	+
Voice tone	Voice variation
Voice volume	
Nonverbal	+
[redacted]nds	Eye contact
Facial expression	Movement
[redacted]ture	
Compatibility of verbal and nonverbal	?
Language -- oral	OK
Vocabulary selection	Projection
[redacted]nunciation	Correct usage
Language -- written	OK
[redacted]ndwriting	Spelling
Clarity	Grammar
[redacted]Layout	
Questioning skills [redacted] improvement	
Levels OK	Form
Probing —	Prompting
[redacted]directing —	Chaining
[redacted]sing/wait-time —	Accepting student ideas
[redacted]ing student ideas +	
Distribution +	Handling student questions
[redacted]inforcement +	
Audiovisual materials [redacted] improvement	
Chalkboard	Slides
Overhead projector	Film strips —
[redacted]tion pictures —	Other
[redacted]ersonal skills	
Teacher-student rapport	+
[redacted]rm	Cooperative
[redacted]cepting +	Trusting +
[redacted]couraging +	Engaging +
Flexible	Open
Polite	
Personal qualities	+
Enthusiasm +	Emotional control
Sincerity +	Forcefulness
[redacted]se of humor +	
[redacted]paration	
Content background	OK
[redacted]ecific to science topic	Education-related knowledge
General knowledge	
Planning	±
[redacted]ls/objectives —	Follow-up —
[redacted]terials OK	Evaluation plan —
Introduction OK	Safety considerations ?
Activities ?	
[redacted]sroom performance	
Introduction	—
Motivation +	Safety precautions ?
[redacted]oblem focus —	Prerequisite skills —
[redacted]rections —	Clarity —
[redacted]ctivities	?
Organization —	Management OK
Control OK	Care of equipment ? and facilities
[redacted]pervision OK	
Follow-up	?
Closure	Synthesizing —
[redacted]aring	Applying —
[redacted]terpreting —	Homework
Evaluation	OK
Compatible with [redacted] goals/objectives	Variety of sources
[redacted] to students	Return time
[redacted] parents	Interpretation of data

Comments

has very positive personal qualities. He communicates his likes and dislikes and is not afraid to let his opinion be known. His personal qualities and ability to communicate with students are his strengths but these are not able to overcome weaknesses in other areas which are important to be a teacher in a public school classroom. planning and classroom performance are areas which could be his downfall as a teacher. Both his cooperating and his supervising teacher asked him on at least two occasions for written planning and evaluation of lessons in advance of the lesson. The were not provided. Classroom visits showed that direc tions for activities and the types of activities were confusing and did not appeal in some cases to all members of the class. did not seem to be worried about this.

Evaluative comment and summary:

Certain aspects of lack of concern about routine and written preparation would not make him a good candidate at this time for a teaching position. could be a very good teacher, if he wanted to be.

Excellent Satisfactory (✓)

[redacted] STUDENT TEACHING | Observer: _____ Class & topic: Chemistry Time in: ____ Time out: ____

Checklist	+ = appropriate – = inappropriate	Comments
[redacted]ication skills		
Verbal	+	Most areas of performance are adequate or above avera; As time goes on, she will be better able to know what chemist students are able to do and better able to deal with their individual needs. Right now, she needs to work on group discussion and questioning techniques. Her questioning skills with groups and lab situations are still mainly direct at the recall level. Another area of concern to her should be her content background. She needs to be more aware of the "facts" of her field versus the "inferences and interpretations". She also needs to use OK and alright not as often.
Voice tone	Voice variation	
Voice volume		
Nonverbal	+	
Hands	Eye contact	
Facial expression	Movement	
Posture		
Compatibility of verbal and nonverbal	+	
Language -- oral	+	
Vocabulary selection	Projection	
Pronunciation	Correct usage	
Language -- written	+	
Handwriting	Spelling	
Clarity	Grammar	
Layout		
Questioning needs improvement		
Levels low	Form	
Probing low	Prompting	
Redirecting low	Chaining	
Pausing/wait-time + –	Accepting student ideas +	
Using student ideas –	Handling student questions +	
Distribution –		
Reinforcement		
Audiovisual materials	+	
Chalkboard +	Slides	
Overhead projector +	Film strips	
Motion pictures +	Other	
Interpersonal skills		
Teacher-student rapport	+	
Warm +	Cooperative	
Accepting +	Trusting +	
Encouraging +	Engaging +	
Flexible	Open	
Polite +		
Personal qualities	+	
Enthusiasm +	Emotional control +	
Sincerity +	Forcefulness +	
Sense of humor +		
Preparation		
Content background	–	
Specific to science topic	Education-related knowledge	
General knowledge	needs beefing up	
Planning	+	
Goals/objectives	Follow-up	
Materials	Evaluation plan	
Introduction	Safety considerations	
Activities		
Lesson performance		
Introduction	+	
Motivation	Safety precautions	
Problem focus	Prerequisite skills	
Directions	Clarity	
Activities	+	
Organization	Management	
Control	Care of equipment and facilities	
Supervision		
Follow-up	+	
Closure	Synthesizing	
Scoring	Applying	
Interpreting	Homework	
Evaluation	+	
Compatible with goals/objectives	Variety of sources	
Return to students	Return time	
Report to parents	Interpretation of data	

Evaluative comment and summary:

has shown that she will be an excellent teacher with mor experience. Her natural enthusiasm and pleasant personality make her a person students will want to have around.

[redacted] STUDENT TEACHING | Observer: _____ Class & topic: Earth/Life Sci. Time in: _____ Time out: _____

Checklist	+ = appropriate - = inappropriate
[redacted]unication skills	
Verbal	+
Voice tone ?	Voice variation +
[redacted]ice volume +	
Nonverbal	+ -
Hands	Eye contact +
Facial expression +	Movement +
[redacted]ture	
Compatibility of verbal and nonverbal	+
Language -- oral	+ -
Vocabulary selection	Projection +
[redacted]nunciation -	Correct usage +
Language -- written	+
Handwriting +	Spelling +
[redacted]Clarity +	Grammar +
[redacted]Layout +	
Questioning	+ -
Levels +	Form +
[redacted]ping +	Prompting +
[redacted]directing +	Chaining
[redacted]sing/wait-time -	Accepting student ideas
Using student ideas	Handling student questions
[redacted]stribution +	
[redacted]inforcement	
Audiovisual materials	+
Chalkboard +	Slides
[redacted]erhead projector +	Film strips
[redacted]tion pictures	Other
Interpersonal skills	
Teacher-student rapport	+
[redacted]m	Cooperative +
[redacted]epting	Trusting
Encouraging	Engaging +
Flexible	Open
[redacted]ite +	
Personal qualities	
Enthusiasm	Emotional control +
[redacted]ncerity +	Forcefulness +
[redacted]se of humor	
Preparation	
Content background	+
[redacted]ecific to science topic +	Education-related knowledge +
General knowledge	
[redacted]ning	
[redacted]ls/objectives +	Follow-up +
[redacted]terials +	Evaluation plan
Introduction +	Safety considerations
[redacted]tivities	
Classroom performance	
[redacted]troduction	+
[redacted]tivation	Safety precautions +
[redacted]blem focus +	Prerequisite skills
[redacted]rections +	Clarity +
[redacted]tivities	+ -
[redacted]ganization +	Management +
[redacted]ntrol +	Care of equipment
[redacted]pervision	and facilities + -
[redacted]llow-up	
[redacted]posure	Synthesizing
[redacted]ring	Applying
[redacted]terpreting	Homework
[redacted]aluation	
[redacted]patible with + -	Variety of sources
[redacted]/objectives	Return time
[redacted] to students	Interpretation of
[redacted]	[redacted]

Comments

- demonstrated an effective use of language, non-verbal and other supportive media for her classroom communications. The use of print and visual materials generally supplemented the classroom activities. Questionning techniques skill need further consideration, i.e., chaining, wait-time, using and accepting student ideas and handling student questions.

preparation was complete well in advance of the actual teaching, thus allowing for interaction with others prior to teaching. Materials and activities were selected fr a variety of sources and were generally supported by AV materials. All student materials were neatly and interestin designed, typed and generally worthwhile. Somewhat greater attention to manipulative activities would be advisable.

teaching image is professional, concerned and business-like. Her consideration of detail and presentation generally convey to be students an open sincerity learning atmoshpere. Greater attention to adding open enthusiasm and dynamic showmanship will continue to increase the teaching effectiveness.

Lessons generally develop logically from pre-lab to lab to post-lab. Pre-lab considered student motivation, problem focus and direction. Attending behavior was well established by a variety of means. Laboratory phase of lessons were well supervised and materials and students were managed effectively. Follow-up discussions generally attended to surfacing the major concepts under consideration.

Evaluative comment and summary:

Very effective instruction and developed a personal teaching style in a rather short time.

IV. Publication Involving Iowa-UPSTEP

Following is a listing of publications that have resulted from the Iowa-UPSTEP Program. Several other reports are in various stages of progress. We expect the Iowa-UPSTEP model to continue as a major source of research in science teacher education for the foreseeable future.

Lunetta, V. N., and Sharp, W. L., "Secondary Science Preservice Teacher Education," In Search of Promising Practices in Science Teacher Education, March, 1973.

Lunetta, V. N., and Zalewski, L. J., "Interactive Incidents," The Science Teacher, April, 1974.

Lunetta, V. N., "Continuing Clinical Experiences as Part of a Four-Year Teacher Education Program," ERIC SMEAC, April, 1974.

Lunetta, V. N., Gore, M., and McLaughlin, D., "Some Thoughts on PACE," Iowa Science Teachers Journal, 1974.

Lunetta, V. N., Yager, R. E., and Sharp, W. L., "Needed: New Models for Science Teacher Education," Science Education, October/December, 1974.

Lunetta, V. N., "Effective Curriculum Diffusion and Implementation," Proceedings of the AAAS Conference on Science Curriculum in Elementary and Junior High Schools, April, 1975.

Lunetta, V. N. "Computer in the Classroom: A Unit in Teacher Education," Journal of Educational Technology Systems, Spring, 1975.

Lunetta, V. N., "Field-Based Clinical Experiences in Science Teacher Education," Science Education, 1975.

Lunetta, V. N. "Iowa-UPSTEP: A Program Overview," The Iowa Science Teachers Journal, December, 1976.

Yager, R. E., and Lunetta, V. N., "Comment on 'Can Science Education Mass Produce Super Teachers,'" Science Education, 1977.

Tamir, P., Lunetta, V. N., and Yager, R. E., "Science Teacher Education: An Assessment Inventory," Science Education, 1978.

Tamir, P. and Lunetta, V. N., "Analysis of Laboratory Inquiries in the Third Edition of the BSCS Yellow Version," The American Biology Teacher, September, 1978.

Yager, R. E., Lunetta, V. N., and Tamir, P. "Trends in Science Teacher Education: 1967-1977," School Science and Mathematics, April, 1979.

Lunetta, V. N., McCurdy, Morris D., and Shymansky, J. A., The Status of Competency Based Teacher Education Programs for Secondary School Science Teachers, 1973-74, Association for the Education of Teachers in Science, March 1974.

Lunetta, V. N., ed., The Iowa-UPSTEP Model, Science Education Center, The University of Iowa, January, 1975.

Lunetta, V. N., Overview and Policies for Iowa-UPSTEP Module Development and Evaluation, Science Education Center, The University of Iowa, July, 1977.

Fuhrman, M., Lunetta, V. N., Novick, S., and Tamir, P., The Laboratory Structure and Task Analysis Inventory (LAI): A User's Handbook, Technical Report 14, Science Education Center, The University of Iowa, August, 1978.

Shymansky, J. A., Penick, J. E., and Wortman, J. D., "A Computer Program Designed to Identify Behavior Patterns in Observational Data," Journal of Classroom Interaction, 1976.

Penick, J. E., and Lunetta, V. N., "Iowa-UPSTEP: A Dynamic Model in Science Teacher Education Now, Journal of Teacher Education, pending.

Penick, J. E., Lunetta, V. N., Kyle, W. C., Jr., and Bonnstetter, R., Current Description and Partial Evaluation of Iowa-UPSTEP, Science Education Center, The University of Iowa, April, 1977.

Penick, J. E., Formative, Descriptive Evaluation of the Iowa-UPSTEP Model, Technical Report 17, University of Iowa, 1979.

Pizzini, E. L., "An Analysis of the Effects of a Component of Iowa-UPSTEP on Self-Concept," Journal of Research in Science Teaching, 1976.

Pizzini, E. L., An Analysis of the Effects of an Undergraduate Pre-Service Teacher Education Program on Selected Personal Characteristics, Ph.D. dissertation, May, 1973.

Yager, R. E., "Humanism Beyond the Classroom," proceedings of Annual Meeting National Science Teachers Association, March, 1974.

Yager, R. E., "Science Education at the University of Iowa, Twenty-five Years, 1950-1975," Science Education Center, The University of Iowa, 1975.

Yager, R. E. "Iowa-UPSTEP: Program Development from 1970 through 1975," Science Education Center, The University of Iowa, 1975.

Yager, R. E., "Summer Institutes for Science Teachers Supported by the National Science Foundation at the University of Iowa," Science Education Center, The University of Iowa, 1976.

Yager, R. E., "In-Service Institutes for Science Teachers Supported by the National Science Foundation at the University of Iowa, Science Education Center, The University of Iowa, 1976.

Yager, R. E., "Effects Upon Students of Today's Science Education," The Journal of Educational Leadership, March, 1977.

Yager, R. E., and Stodghill, R., "School Science in an Age of Science," Journal of Educational Leadership, March, 1979.

V. Conclusions, Implications, the Future

Following are specific conclusions following the development, production and evaluation efforts related to Iowa-UPSTEP, 1970-80:

A. An integrated teacher education program is possible--even in a multi-purpose major university.

B. It is possible to develop modules for science teacher education; several modules are transportable to other campuses.

C. A science major can be developed specifically for the preparation of science teachers; such programs can include philosophy/history/sociology of science as well as application-type courses in science.

D. A variety of interesting experiences can be successfully incorporated into the science teacher education program.

E. Evaluation can be developed as an integral part of the program; self-assessment strategies are particularly important.

F. A dynamic teacher education program involves in-service teachers for recruitment, curriculum development, and internship development.

G. It is possible to open lines of communication and to maintain cooperative efforts in program planning, execution, and development.

Following are some implications for mounting a teacher education program like the Iowa-UPSTEP model:

A. Communication with other teacher educators (on-campus, off-campus, at other teacher education centers) is time-consuming, demanding, and a continuing need.

B. There is a critical mass in terms of students, a staff, and administration and financial support; energy and effort must be spent to assure that such a critical mass is maintained.

C. A dynamic program is a constantly changing one; evaluative information

must be used for program improvement.

D. Teacher education remains an art at many institutions; there is hesitancy among teacher educators for sharing philosophies, approaches, and problems.

E. A model such as Iowa-UPSTEP requires an institutional commitment that is greater than often is found in teacher education programs; UPSTEP approaches and procedures can be used in a variety of disciplines at a given university.

F. As teacher supply increases, there is greater interest in quality programs and cooperation; there is more interest in 1980 than in 1970 for input from schools and in-service teachers.

G. The Iowa-UPSTEP model has attracted considerable international attention; this has implications for leadership, graduate programs, and research in science education.

Several generalizations concerning Iowa-UPSTEP and the future are possible. Some of these are:

A. There appears to be a genuine shortage of science teachers, especially in the physical sciences and in the area of science and society; more effort in terms of recruitment and cooperation with in-service teachers is needed.

B. Interest in Iowa-UPSTEP modules and evaluation efforts is significant; the Iowa-UPSTEP program and staff continues central in promoting communication, mutual efforts, and evaluation of teacher education nationally.

C. The Iowa-UPSTEP model continues to influence teacher education practices and programs at the University of Iowa; as interdisciplinary approaches become more attractive, Iowa-UPSTEP modules have more general applicability.

D. Maintaining current staff is a necessity for maintaining a quality program that has received such national and international attention; when the

program funds were depleted in 1975, the University of Iowa committed itself to the staff and its maintenance of the model. With such commitment this program can continue to evolve and to provide a model.

E. More coordination with high school student program (SSTP) and with in-service workshops (ASSIST) is needed and is occurring; the coordination promises continuing growth, evaluation, and study of the model.

F. If means can be found for continuing the dissemination phase of the program, the impact of the Iowa-UPSTEP material across the U.S. is likely to increase and to expand.

G. New formulae for determining staff loads are needed; the added field experiences, advising (over a six year period), seminars, program coordination, evaluation efforts are significantly greater than for teaching standard courses to groups of enrollees; mechanisms must be found for communicating these special needs locally and nationally.