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Technical Report Series

SCIENCE EDUCATION CENTER

The University of Iowa

March, 1979

technical report 17

A Formative, Descriptive Evaluation of the Iowa-UPSTEP Model

by

John E. Penick

The Technical Report Series

The Technical Report Series of the Science Education Center, University of Iowa, was established by action of the faculty during 1973. The series provides a mechanism for communicating results of research, developmental projects, and philosophical investigations to others in Science Education. The reports include details and supporting information not often included in publications in national journals.

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Robert E. Yager, Coordinator
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PREFACE

This report describes a partial evaluation of the Iowa-UPSTEP model in its various phases since it was originally funded in 1970. The first phase, funded until 1975 by the National Science Foundation under the Undergraduate Pre-Service Teacher Education Program (UPSTEP), called for developing a model science teacher education program. The second phase, funded in 1975 for 3 years and later extended to five years, emphasizes the development and formative evaluation of modules concerning program features.

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Introduction

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Many science educators identified the problem immediately--the teacher. Millions of dollars then went into inservice teacher education efforts which, in the long run, didn't provide much impact. To surmount this problem, several curricula were designed specifically to be "teacher-proof". Several of these succeeded to some extent by moving the teacher into a managerial role. Most met the same ignominious fate as prior curriculum efforts.

Gradually it became apparent that changing the curriculum did just that and nothing more; to change classroom practices and attitudes, teachers had to be reached early and involved in a major way. Teacher education efforts began shifting from inservice toward preservice education. Along with this new focus came new monies for developing preservice teacher education programs. Some of this money, from the National Science Foundation, was awarded to the University of Iowa Science Education Center in 1970.

Science Teacher Education

In conventional teacher education programs, professional courses in teaching have always followed the major portion of the students' college career. These conventional programs provide for little, if any, formal interaction

between the professional education sequence and the course in the students' major science area. In fact, students were prevented by the program structure from pursuing these interests simultaneously. They could not formally pursue science related activities with children until late in their college career; and the full semester of student teaching during the senior year precluded concurrent work in a scientific area of interest at that time. The original UPSTEP program in 1970 looked like a rather well-enhanced, clinically oriented, but conventional teacher education program.

UPSTEP was committed to identifying and recruiting science oriented students into teaching at the high school or early college level. This early recruitment would allow secondary science majors the benefit of selecting their major field of study early and taking advantage of more opportunities in science education. Individual UPSTEP courses were designed to allow and facilitate interaction among students early in the program and involved cooperating teachers in the public schools as full collaborators in their education. Special effort was taken to see that UPSTEP students were competent in the use of the new science curricula developed for the students of the 60's and 70's. Part of this competence involved early clinical experience in a variety of settings, including elementary junior high, and high school.

Yager (NSF Proposal, 1970) identified some of the original objectives for Iowa-UPSTEP as follows:

1. Recruitment: To recruit science-oriented high school students into a science teacher preservice program by means of promotional films, video-tapes, faculty visits, brochures, questionnaires and with the cooperation of local school administrators, science supervisors, and science teachers.
2. Counseling: To establish science education faculty members at the

University of Iowa as special advisors for the five year program to guide the UPSTEP participants through an undergraduate program for modern science teachers.

3. Trial Teaching: To give UPSTEP participants the opportunity to teach short sequences of science courses at elementary, junior high, high school, and college levels early in their college careers.

4. Science Proficiency: To determine a program for UPSTEP participants which includes:

   a. a thorough college level study of a major science area;
   b. correlative studies in other areas of science and mathematics sufficient for later pursuit of graduate work;
   c. courses designed around historical, cultural, philosophical, and economic aspects of science;
   d. a substantial research project in the major science field;
   e. culminating courses which synthesize the content of a major field that will exemplify the modern secondary programs.

5. Cognitive Development: To acquaint the preservice science teachers with cognitive development of students in logical reasoning tasks associated with science by both classroom discussion and personal interviews with students.

6. New Science Curricula: To involve preservice science teachers in training programs for the science curriculum reforms--first as participants and then as instructors.

The original director believed that these objectives would lead to a teacher education program that would produce teachers which would:

1. maintain currentness in content and practices
2. be adaptable
3. be able to select and develop instructional materials relevant to the individual student and the modern world
4. have positive attitudes toward science teaching
5. fill deficit areas in junior high science, physics, chemistry and biology
6. be proficient in diagnosis and remediation.

Since all of these activities involve a great deal of faculty support and staff time, it was also hoped that barriers between UPSTEP students and UPSTEP faculty

could be broken down, providing students with a more professional feeling and role in their own education. Closer involvement also allowed faculty members to effectively model appropriate classroom behaviors.

The science teacher preparation program at the University of Iowa, like many other programs, has been evolving for a number of years. During the past four or five years, though, the process at Iowa has been noticeably more rapid than before.

These changes, stimulated by student, teachers, university science educators, and a substantial grant from the National Science Foundation, has changed the original Iowa program into a four-year, clinically-oriented, intensive science teacher preparation program.

The general trend in the original UPSTEP program at the University of Iowa was to expand the science major throughout the four years and to move some of the professional education from the senior year back into earlier years, providing opportunities for simultaneous work in both science professional education. By 1975, this expansion and movement was virtually completed and the UPSTEP program had matured to the point that changes now tend to be within individual program components rather than sweeping across the broad scope of the total program.

Iowa-UPSTEP is now a four-year program in that our students are being provided with relevant science education experiences in the freshmen year that continue throughout their undergraduate years. Providing undergraduate students with early opportunities to deal with some of the realities of science teaching allows them to make equally early commitments to science education or to change their career goals.

Early entry into the science teacher preparation process also encourages long-term student-faculty relationships--relationships which seem necessary in helping students become more competent science teachers. Student who spread their professional preparation over all four years are also finding that science courses are becoming a more integral and important part of their total program.

The ultimate goal of Iowa-UPSTEP is facilitating the development of individual teachers who have a significant rationale for teaching science and the ability to apply that rationale in a classroom setting. The rationale is essentially a conceptualization of the dynamic, simultaneous interaction of all of the following:

1. teacher, student and societal goals for science education;
2. why science should be taught;
3. what science must be learned;
4. the nature of science;
5. the nature of children and learning;
6. how to facilitate learning in science in a manner consistent with what is known about children, learning, and science;
7. how personally to assess, evaluate, and change classroom climates and strategies to achieve progress toward stated goals.

In the Iowa-UPSTEP model, such a rationale must have a research-supported base; it must be defensible in terms of current research. Statements including "I believe ...", "They say ...", or even "I tried it and it didn't work", are considered as relevant but not adequate supporting evidence for a teacher's rationale.

To facilitate developing the preservice teacher's rationale and skills the

current Iowa-UPSTEP program integrates the professional education sequence with the total undergraduate program. This professional sequence provides seminars each academic term and includes at least three different clinical experiences. The current UPSTEP professional program sequence is:

FRESHMAN YEAR -- In the fall, evening seminars and occasional social events introduce incoming students to the University and to issues in science and education. Half of these early seminars involve scientists discussing their personal evolution as scientists as well as their views about the nature of science and science-teaching. During alternate weeks the students discuss issues in science and education while becoming aware of communication skills and group processes.

Participating in an elementary school science classroom occupies a portion of the spring term for freshmen. Along with this clinical experience, students attend a weekly seminar designed to make the experience more productive for both the children involved and the UPSTEP student. Seminar activities include working with materials from activity-centered curricula, discussing field experiences, talking with classroom teachers and other professionals, discussing child development and relevant learning theory, and probing the basic question of, "What is science and how do I teach it?"

During these two semesters, UPSTEP students are strongly encouraged to examine their career goals. Following the elementary clinical experience, a f[illegible]tudents may decide that pursuing a degree in elementary education is their goal while others may make decisions involving careers totally removed from education.

The Spring semester of each year also provides an optional UPSTEP seminar

once every other week. These seminars introduce interested science and science education majors to a variety of speakers from the broad field of science and allow for close interaction of non-teaching science majors with UPSTEP students.

SOPHOMORE YEAR -- The second UPSTEP fall begins by introducing student to more formal issues in secondary school teaching and learning. An optional clinical experience is taken concurrently by some students. During this term students are critically looking at historical, political, and cultural issues and their effects on education and teaching. Along with these human aspects, UPSTEP students are experiencing a variety of creative educational alternatives while examining personal goals and values relating to education.

During this same year, students study education psychology and an optional UPSTEP clinical experience is again encouraged. During this time students begin a two-course sequence in the Meaning of Science and Science in Historical Perspective designed to focus attention on the nature and processes of science.

JUNIOR YEAR -- By the junior year UPSTEP students, having had several opportunities to make career decisions, are deeply committed to science teaching. Capitalizing on this commitment are two successive semesters of intensive methods seminars. The first of these provides a fifteen-week clinical experience and three hour weekly seminars on developing and evaluating a self-instructional module, assessing levels of intellectual development in children, preparing case studies, individualizing instruction, developing human relations skills, and exploring teaching strategies appropriate to conceptual learning in science. During this time the UPSTEP students are also actively involved in a Self-Instructional Laboratory which provides models, resources, and assistance for

designing and producing self-instructional materials.

The second junior year methods seminar provides opportunities to explore and interact with a variety of science curricula while further developing science teaching goals and strategies. These teaching goals and strategies, in combination with prior aspects of the UPSTEP program, enable students to put together, for the first time, a thorough, research-based rationale for teaching science.

This rationale, including goals for science students, the nature of science, how children learn, and teaching strategies, is followed by UPSTEP students during four days of videotaped teaching sessions in a junior high school. After these sessions, students learn techniques of rationale-based self-assessment, evaluation, and revision which they can profitably use without help.

SUMMER PROGRAM -- The summer program is an extremely valuable part of this Iowa-UPSTEP program. Designed to break down preservice-inservice barriers, the program provides two major options for students. UPSTEP students can be found working as teacher interns or counselors in various activities of the Iowa Secondary Science Training Program (working on campus or on extended field trips to natural areas) or serving as staff in the UPSTEP Summer Curriculum Revision Workshops for teachers. These workshops, held in a local community, generally consist of two weeks of intensive effort designed to produce a usable end product -- a curriculum designed by and for the teachers in that community. The underlying goals of the workshops are identical with the overall UPSTEP program goals.

SENIOR YEAR -- At this time, teacher interns are participating in advanced clinical experiences that are similar to traditional student teaching. Although UPSTEP students assume responsibility for planning and teaching secondary science classes

under the supervision of a cooperating teacher, this is not always the usual all-day, all-semester experience. 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.

Using clinical experiences during a four-year teacher education program provides a convenient means of combining the skills, perspective, and intimacy of the university enrollment with the realism of the public school classroom. The UPSTEP four-year program permits a variety of experiences with people in diverse environments with complementary experiences leading to proficiency in science. While providing a variety of entry and exit points for students who wish to explore teaching as a career alternative, UPSTEP also facilitates attitude and behavior changes which are appropriate for effective teaching. The Iowa-UPSTEP program is a unique model in teacher education that has received national and international recognition.

TABLE 1

Clock Hours Associated with Components of Iowa-UPSTEP Program

	Seminar	Clinical
Freshman Seminar	22.5	0
Freshman Clinical Experience	20	45
Intro. to Secondary School Teaching	37.5	0
Educational Psychology	37.5	0
Methods I	37.5	75
Methods II	60	12
Student Teaching	30	375
	245	507

TOTAL Clock Hours: 752

Upstep Modules

A major portion of the 1975 National Science Foundation award to the Iowa-UPSTEP program is for the development of teacher education modules for use by other institutions. A number of these teacher education modules have been printed in trial editions and are currently being field tested in several institutions. A complete list of UPSTEP modules and publications can be found in Appendix A. No discussion of the evaluation of modules will appear in this paper.

Upstep Program Evaluation

The set of conditions that initially stimulated the need for Iowa-UPSTEP in 1969 has changed many times in the eight years of development and operation. Although the demands for science teachers has decreased, 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 are 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. Golomon (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 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 2, 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 2

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 Hrs. 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 clinical 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 to students in their second methods course. Finally, since 1978, MAPE has been administered at the end of 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

   Acknowledges (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 wish. 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 judgement is implied that the average position is desirable. The authors of MAPE expect teachers and pre-service 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.

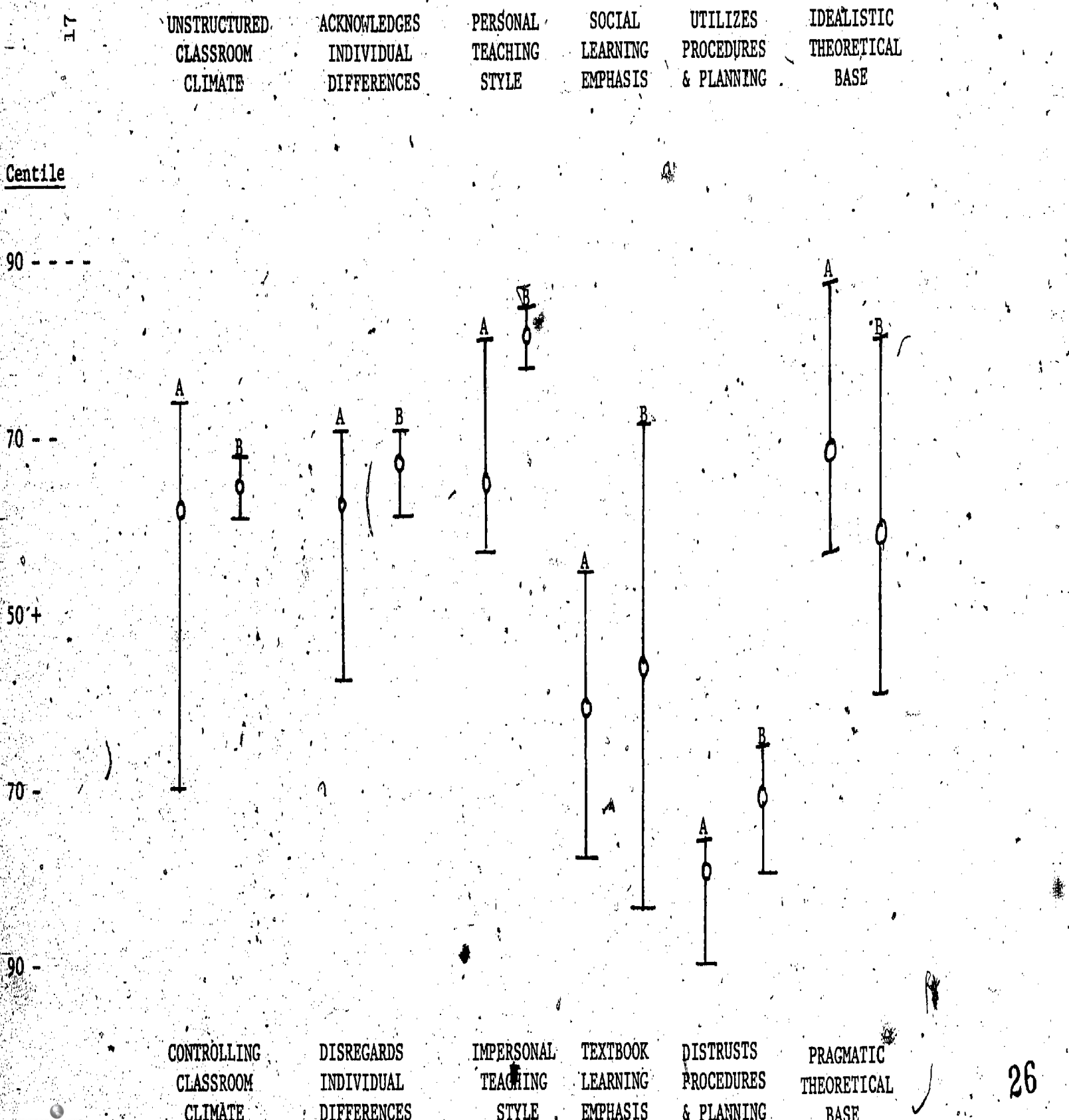
The information obtained from the MAPE instrument has provided students with very important and essential information regarding their educational philosophies. It has proven to be beneficial for students encountering their first field experience in education to be provided such information, so that they 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.

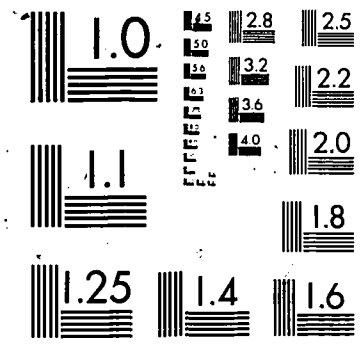
Results of the MAPE scoring (Figure 1) indicate that students entering the freshman program have mean scores not appreciably different than students a year later in the second methods course. The range of responses is of importance, though. The beginning students show a wide variety of responses while 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.

Figure 1

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





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between the professional education sequence and the course in the students' major science area. In fact, students were prevented by the program structure from pursuing these interests simultaneously. They could not formally pursue science related activities with children until late in their college career; and the full semester of student teaching during the senior year precluded concurrent work in a scientific area of interest at that time. The original UPSTEP program in 1970 looked like a rather well-enhanced, clinically oriented, but conventional teacher education program.

UPSTEP was committed to identifying and recruiting science oriented students into teaching at the high school or early college level. This early recruitment would allow secondary science majors the benefit of selecting their major field of study early and taking advantage of more opportunities in science education. Individual UPSTEP courses were designed to allow and facilitate interaction among students early in the program and involved cooperating teachers in the public schools as full collaborators in their education. Special effort was taken to see that UPSTEP students were competent in the use of the new science curricula developed for the students of the 60's and 70's. Part of this competence involved early clinical experience in a variety of settings, including elementary, junior high, and high school.

Yager (NSF Proposal, 1970) identified some of the original objectives for Iowa-UPSTEP as follows:

1. Recruitment: To recruit science-oriented high school students into a science teacher preservice program by means of promotional films, video-tapes, faculty visits, brochures, questionnaires and with the cooperation of local school administrators, science supervisors, and science teachers.
2. Counseling: To establish science education faculty members at the

University of Iowa as special advisors for the five year program to guide the UPSTEP participants through an undergraduate program for modern science teachers.

3. Trial Teaching: To give UPSTEP participants the opportunity to teach short sequences of science courses at elementary, junior high, high school, and college levels early in their college careers.

4. Science Proficiency: To determine a program for UPSTEP participants which includes:

   a. a thorough college level study of a major science area;
   b. correlative studies in other areas of science and mathematics sufficient for later pursuit of graduate work;
   c. courses designed around historical, cultural, philosophical, and economic aspects of science;
   d. a substantial research project in the major science field;
   e. culminating courses which synthesize the content of a major field that will exemplify the modern secondary programs.

5. Cognitive Development: To acquaint the preservice science teachers with cognitive development of students in logical reasoning tasks associated with science by both classroom discussion and personal interviews with students.

6. New Science Curricula: To involve preservice science teachers in training programs for the science curriculum reforms--first as participants and then as instructors.

The original director believed that these objectives would lead to a teacher education program that would produce teachers which would:

1. maintain currentness in content and practices
2. be adaptable
3. be able to select and develop instructional materials relevant to the individual student and the modern world
4. have positive attitudes toward science teaching
5. fill deficit areas in junior high science, physics, chemistry and biology
6. be proficient in diagnosis and remediation.

Since all of these activities involve a great deal of faculty support and staff time, it was also hoped that barriers between UPSTEP students and UPSTEP faculty

could be broken down, providing students with a more professional feeling and role in their own education. Closer involvement also allowed faculty members to effectively model appropriate classroom behaviors.

The science teacher preparation program at the University of Iowa, like many other programs, has been evolving for a number of years. During the past four or five years, though, the process at Iowa has been noticeably more rapid than before.

These changes, stimulated by student, teachers, university science educators, and a substantial grant from the National Science Foundation, has changed the original Iowa program into a four-year, clinically-oriented, intensive science teacher preparation program.

The general trend in the original UPSTEP program at the University of Iowa was to expand the science major throughout the four years and to move some of the professional education from the senior year back into earlier years, providing opportunities for simultaneous work in both science professional education. By 1975, this expansion and movement was virtually completed and the UPSTEP program had matured to the point that changes now tend to be within individual program components rather than sweeping across the broad scope of the total program.

Iowa-UPSTEP is now a four-year program in that our students are being provided with relevant science education experiences in the freshmen year that continue throughout their undergraduate years. Providing undergraduate students with early opportunities to deal with some of the realities of science teaching allows them to make equally early commitments to science education or to change their career goals.

Early entry into the science teacher preparation process also encourages long-term student-faculty relationships--relationships which seem necessary in helping students become more competent science teachers. Student who spread their professional preparation over all four years are also finding that science courses are becoming a more integral and important part of their total program.

The ultimate goal of Iowa-UPSTEP is facilitating the development of individual teachers who have a significant rationale for teaching science and the ability to apply that rationale in a classroom setting. The rationale is essentially a conceptualization of the dynamic, simultaneous interaction of all of the following:

1. teacher, student and societal goals for science education;
2. why science should be taught;
3. what science must be learned;
4. the nature of science;
5. the nature of children and learning;
6. how to facilitate learning in science in a manner consistent with what is known about children, learning, and science;
7. how personally to assess, evaluate, and change classroom climates and strategies to achieve progress toward stated goals.

In the Iowa-UPSTEP model, such a rationale must have a research-supported base; it must be defensible in terms of current research. Statements including "I believe ...", "They say ...", or even "I tried it and it didn't work", are considered as relevant but not adequate supporting evidence for a teacher's rationale.

To facilitate developing the preservice teacher's rationale and skills the

current Iowa-UPSTEP program integrates the professional education sequence with the total undergraduate program. This professional sequence provides seminars each academic term and includes at least three different clinical experiences. The current UPSTEP professional program sequence is:

FRESHMAN YEAR -- In the fall, evening seminars and occasional social events introduce incoming students to the University and to issues in science and education. Half of these early seminars involve scientists discussing their personal evolution as scientists as well as their views about the nature of science and science teaching. During alternate weeks the students discuss issues in science and education while becoming aware of communication skills and group processes.

Participating in an elementary school science classroom occupies a portion of the spring term for freshmen. Along with this clinical experience, students attend a weekly seminar designed to make the experience more productive for both the children involved and the UPSTEP student. Seminar activities include working with materials from activity-centered curricula, discussing field experiences, talking with classroom teachers and other professionals, discussing child development and relevant learning theory, and probing the basic question of, "What is science and how do I teach it?"

During these two semesters, UPSTEP students are strongly encouraged to examine their career goals. Following the elementary clinical experience, a few students may decide that pursuing a degree in elementary education is their goal while others may make decisions involving careers totally removed from education.

The Spring semester of each year also provides an optional UPSTEP seminar

once every other week. These seminars introduce interested science and science education majors to a variety of speakers from the broad field of science and allow for close interaction of non-teaching science majors with UPSTEP students.

SOPHOMORE YEAR -- The second UPSTEP fall begins by introducing student to more formal issues in secondary school teaching and learning. An optional clinical experience is taken concurrently by some students. During this term students are critically looking at historical, political, and cultural issues and their effects on education and teaching. Along with these human aspects, UPSTEP students are experiencing a variety of creative educational alternatives while examining personal goals and values relating to education.

During this same year, students study education psychology and an optional UPSTEP clinical experience is again encouraged. During this time students begin a two-course sequence in the Meaning of Science and Science in Historical Perspective designed to focus attention on the nature and processes of science.

JUNIOR YEAR -- By the junior year UPSTEP students, having had several opportunities to make career decisions, are deeply committed to science teaching. Capitalizing on this commitment are two successive semesters of intensive methods seminars. The first of these provides a fifteen-week clinical experience and three hour weekly seminars on developing and evaluating a self-instructional module, assessing levels of intellectual development in children, preparing case studies, individualizing instruction, developing human relations skills, and exploring teaching strategies appropriate to conceptual learning in science. During this time the UPSTEP students are also actively involved in a Self-Instructional Laboratory which provides models, resources, and assistance for

designing and producing self-instructional materials.

The second junior year methods seminar provides opportunities to explore and interact with a variety of science curricula while further developing science teaching goals and strategies. These teaching goals and strategies, in combination with prior aspects of the UPSTEP program, enable students to put together, for the first time, a thorough, research-based rationale for teaching science.

This rationale, including goals for science students, the nature of science, how children learn, and teaching strategies, is followed by UPSTEP students during four days of videotaped teaching sessions in a junior high school. After these sessions, students learn techniques of rationale-based self-assessment, evaluation, and revision which they can profitably use without help.

SUMMER PROGRAM -- The summer program is an extremely valuable part of this Iowa-UPSTEP program. Designed to break down preservice-inservice barriers, the program provides two major options for students. UPSTEP students can be found working as teacher interns or counselors in various activities of the Iowa Secondary Science Training Program (working on campus or on extended field trips to natural areas) or serving as staff in the UPSTEP Summer Curriculum Revision Workshops for teachers. These workshops, held in a local community, generally consist of two weeks of intensive effort designed to produce a usable end product -- a curriculum designed by and for the teachers in that community. The underlying goals of the workshops are identical with the overall UPSTEP program goals.

SENIOR YEAR -- At this time, teacher interns are participating in advanced clinical experiences that are similar to traditional student teaching. Although UPSTEP students assume responsibility for planning and teaching secondary science classes

under the supervision of a cooperating teacher, this is not always the usual all-day, all-semester experience. 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.

Using clinical experiences during a four-year teacher education program provides a convenient means of combining the skills, perspective, and intimacy of the university enrollment with the realism of the public school classroom. The UPSTEP four-year program permits a variety of experiences with people in diverse environments with complementary experiences leading to proficiency in science. While providing a variety of entry and exit points for students who wish to explore teaching as a career alternative, UPSTEP also facilitates attitude and behavior changes which are appropriate for effective teaching. The Iowa-UPSTEP program is a unique model in teacher education that has received national and international recognition.

TABLE 1

Clock Hours Associated with Components of Iowa-UPSTEP Program

	Seminar	Clinical
Freshman Seminar	22.5	0
Freshman Clinical Experience	20	45
Intro. to Secondary School Teaching	37.5	0
Educational Psychology	37.5	0
Methods I	37.5	75
Methods II	60	12
Student Teaching	30	375
	245	507

TOTAL Clock Hours: 752

Upstep Modules

A major portion of the 1975 National Science Foundation award to the Iowa-UPSTEP program is for the development of teacher education modules for use by other institutions. A number of these teacher education modules have been printed in trial editions and are currently being field tested in several institutions. A complete list of UPSTEP modules and publications can be found in Appendix A. No discussion of the evaluation of modules will appear in this paper.

Upstep Program Evaluation

The set of conditions that initially stimulated the need for Iowa-UPSTEP in 1969 has changed many times in the eight years of development and operation. Although the demands for science teachers has decreased, 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 are 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. Golomon (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 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 2, 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 2

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 Hrs. 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 clinical 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 to students in their second methods course. Finally, since 1978, MAPE has been administered at the end of 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

   Acknowledges (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 wish. 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 judgement is implied that the average position is desirable. The authors of MAPE expect teachers and pre-service 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.

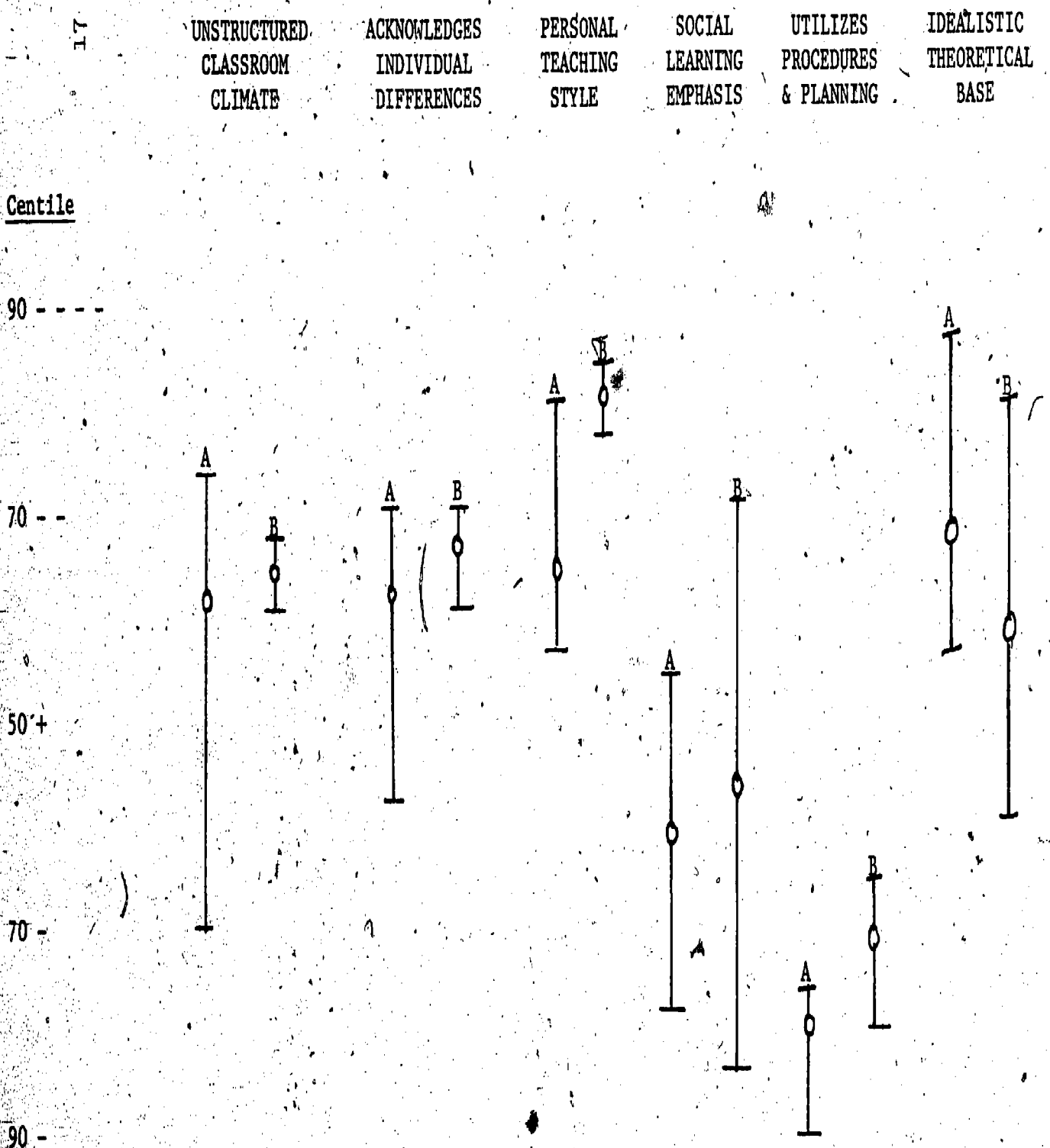
The information obtained from the MAPE instrument has provided students with very important and essential information regarding their educational philosophies. It has proven to be beneficial for students encountering their first field experience in education to be provided such information, so that they 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 1) indicate that students entering the freshman program have mean scores not appreciably different than 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.

Figure 1

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



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 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 3).

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 4. Teacher education was also seen as important outside of the classroom (Table 5). Table 6 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 3

FACTORS INFLUENCING ACCEPTANCE OF CURRENT EMPLOYMENT

		Highly Important	Somewhat Important	Somewhat Unimportant	Highly Unimportant	Omitted
a.	Opportunity to use special abilities or 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 4

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 Instructional 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 5

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 type 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 better speaking habits	22.4	49.0	20.4	8.2	0.0
h. Developing leadership skills	16.3	51.0	18.4	14.3	0.0
i. Making the most out of my potential	22.4	40.8	14.3	20.4	2.1

TABLE 6

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	Omit
a. Skill in selecting and 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?

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

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.

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 place more emphasis on certain areas or less emphasis on others?

The general pattern of responses 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%).

What did these professional courses provide for you as a teacher?

a. Educational Psychology
b. Freshman Teaching Practicum
c. Methods I and II
d. 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 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 mentione (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 exci- 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.

TABLE 10

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

Past Graduate	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 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 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

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 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 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.

TABLE 17

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.

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 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 3).

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 4. Teacher education was also seen as important outside of the classroom (Table 5). Table 6 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 3

FACTORS INFLUENCING ACCEPTANCE OF CURRENT EMPLOYMENT

	Highly Important	Somewhat Important	Somewhat Unimportant	Highly Unimportant	Omitted
a. Opportunity to use special abilities or 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 4

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 Instructional 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 5

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 type 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 better speaking habits	22.4	49.0	20.4	8.2	0.0
h. Developing leadership skills	16.3	51.0	18.4	14.3	0.0
i. Making the most out of my potential	22.4	40.8	14.3	20.4	2.1

TABLE 6

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	Omit
a. Skill in selecting and organizing materials	55.1	34.7	2.1	4.1	4.1	57.1	18.4	24.
b. Skill in technique of instruction	55.1	26.5	6.1	8.2	4.1	55.1	24.5	20.
c. Skill in group management	46.9	32.6	10.2	6.1	8.2	28.6	44.9	26.
d. Skill in developing work habits	30.6	46.9	10.2	8.2	4.1	44.9	32.7	20.
e. Skill in developing interpersonal relationships	57.1	34.7	6.1	0.0	2.1	34.7	40.8	22.
f. Ability to profit from suggestions for improvement	40.8	46.9	8.2	0.0	4.1	57.1	18.7	24.
g. Ability to evaluate own performance	63.3	24.5	4.1	0.0	4.1	51.0	24.5	24.
h. Ability to evaluate the performance of others	42.9	34.7	12.2	4.1	6.1	49.0	24.5	26.

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?

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

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.

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 place more emphasis on certain areas or less emphasis on others?

The general pattern of responses 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%);

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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%).

What did these professional courses provide for you as a teacher?

a. Educational Psychology
b. Freshman Teaching Practicum
c. Methods I and II
d. 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.

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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.

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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 mentione (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 exci- 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.

TABLE 10

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

Past Graduate	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 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 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

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 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 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.

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

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

	Is Provision Adequate?					
			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	29%	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 Student 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 1978-79 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 American College Testing Program 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 are shown in Figures 2 and 3.

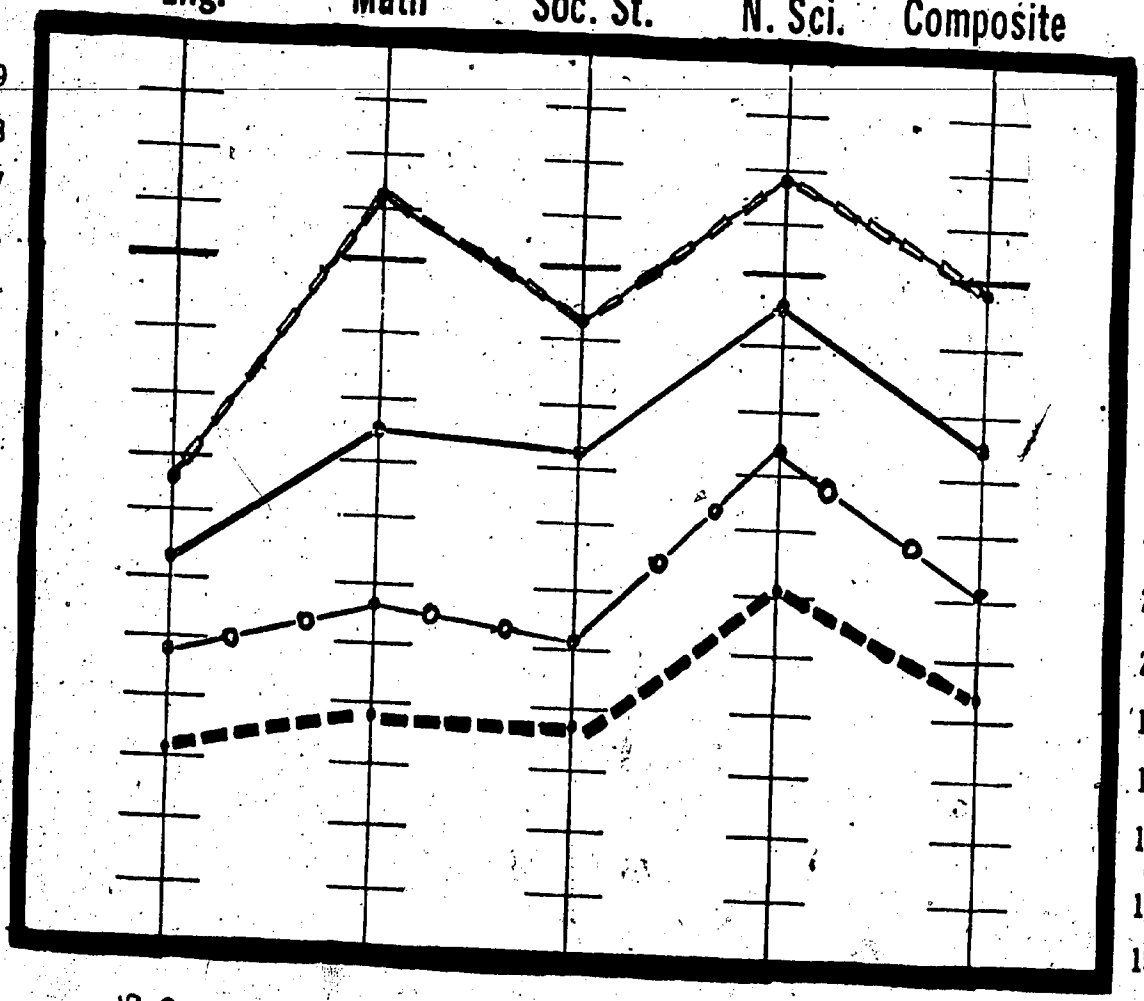
Standard Scores on ACT Battery
A = 1973-75 B = 1976-78 *

		ENGLISH		MATHEMATICS		SOCIAL STUDIES		NATURAL SCIENCE		COMPOSITE	
		A	B	A	B	A	B	A	B	A	B
New Freshman Liberal Arts Students N_A=7640, N_B=8047	Mean	22	21	24	23	24	22	26	25	24	23
	S.D.	4	4	6	7	6	6	5	6	4	5
New Fresman Liberal Arts with indicated pre-medicine major N_A=613, N_B=494	Mean	22	22	28	27	25	25	29	28	26	26
	S.D.	4	4	5	5	5	6	4	5	4	4
All UPSTEP Students N_A=89, N_B=47	Mean	23	22	27	27	25	24	28	26	26	25
	S.D.	4	4	5	4	4	3	4	4	4	

* for UPSTEP Students; A = 1975-76, B = 1978-79

1975-76

Comparison of the Mean ACT Scores with Means of Other Groups

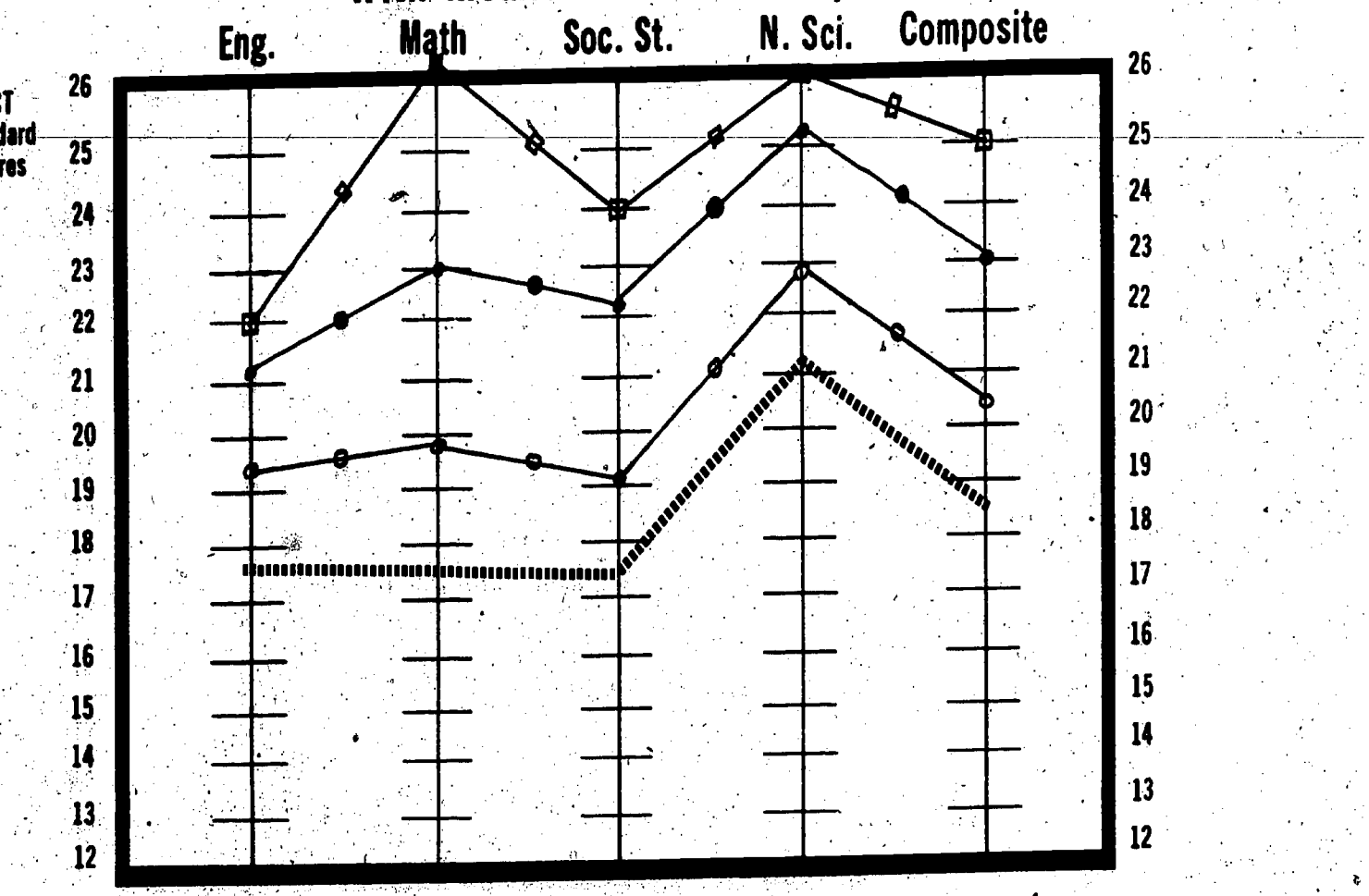


	Eng.	Math	Soc. St.	N. Sci.	Composite
nal Mean:	18.2	18.9	18.7	21.1	19.4
ite Mean:	19.8	20.6	20.1	23.4	21.1
cal Mean:	21.3	23.5	23.2	25.5	23.5
EP Mean:	22.6	27.3	25.3	27.9	25.9

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

Fall 1978

Comparison of the Mean ACT Scores with Means of Other Groups



	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: □—□—□

SATIC

SATIC (Figure 4) (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 ooded 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 1976-78 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 late 1978 and the overall small numbers. Efforts are also being made ot 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.

Figure 4

SATIC Coding Sheet*

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 →	
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 →	

5 minutes *10 minutes* *15 minutes*

Percent of I

Percent of R

Comments:

*A system of teacher evaluation devised by Dorothy M. Schlitt 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
$\bar{X}$ 1976-78 (N=21)	25	36	0.57	10	46	0.80	24	34	0.72

*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 A

Appendix A

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 feasable, 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 character-

istic 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 sould 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 questionning 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 experience 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 instructional 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.

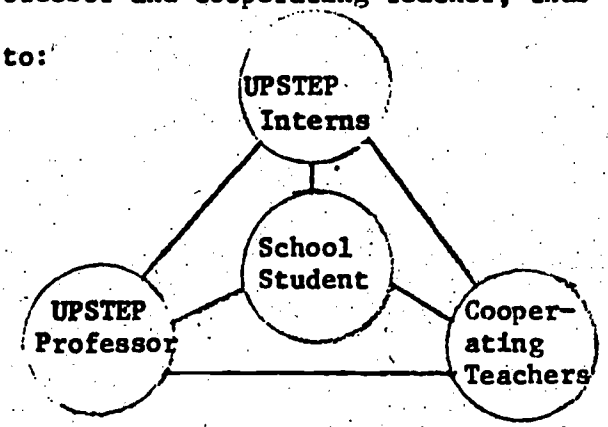
2. The identification, selection, and development of a cadre of diverse and effective cooperating teachers is needed to increase the effectiveness and compatibility of clinical experiences placements. At present UPSTEP does not devote enough effort to achieve optional clinical placements; inappropriate 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 interactions. 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 simplifying 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 B

Appendix B

Iowa-UPSTEP Publications

Modules	Status (November 1978)
Introductory UPSTEP Seminar (97:110)	
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	*Trial ed. printed 11/76*
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 and 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 (7S:152)

VI-A.	Teaching the Life Sciences	*Proposed*
VI-B.	Teaching the Physical Sciences	*Proposed*
VI-C.	Selecting Program Goals and Materials: Minimodules 1. Content, Themes, and Objectives in High School Science 2. Sequencing Strategies 3. Evaluating and Selecting Curriculum Materials 4. The Science Department Game	*Trial ed. printed 11/78*
VI-D.	Strategies for Science Teaching: Minimodules 1. Exploring the Instructional Potential of Common Objects 2. Brainstorming Phenomena 3. Demonstrations in Science Teaching	*Trial ed. printed 11/78*
VI-E.	Evaluating Student Learning and Attitudes	*Trial ed. printed 8/77*
VI-F.	Teaching Laboratory Science	*Trial ed. printed 11/76 revisions under way*
VI-G.	Developing Laboratory Science Skills	*Trial ed. printed 10/78*
VI-H.	Laboratory Safety and Teacher Liability	*Trial ed. printed*
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 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	*Under way*

Curriculum Workshop and Design (7S:190)

VII-A.	Designing and Evaluating Curricula	*Proposed*
VII-B.	Preparing a Model Learning Unit	*Proposed*

Intern Teaching (7S:191/192)

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 3/77*

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 and 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 and 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 Data 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*

APPENDIX C

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 chairmen, 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 youngster and the Science program that he is involved in. He is somewhat reserved, has a good professional attitude and 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, 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" image.

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's 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 S 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.

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