



THE CONNECTICUT STATE UNIVERSITY

P.O. Box 2008 • New Britain, Connecticut 06050 • (203) 827-7700

RESOLUTION

concerning

LICENSURE APPLICATION

for

SIXTH YEAR CERTIFICATE

for

CLASSROOM TEACHER SPECIALIST (SECONDARY EDUCATION)

at

SOUTHERN CONNECTICUT STATE UNIVERSITY

May 3, 1985

RESOLVED,

That under the authority granted the Board of Trustees in Chapter 185b, Sections 10a-87 and 10a-149 of the General Statutes, the President of the Connecticut State University is authorized to seek approval from the Board of Governors for implementation of a program leading to a Sixth-Year Certificate for Classroom Teacher Specialist (Secondary Education) presented by Southern Connecticut State University.

A Certified True Copy:

James A. Frost
President

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OFFICE OF THE PRESIDENT

A unit of The Connecticut State University

SOUTHERN CONNECTICUT STATE UNIVERSITY

501 Crescent Street • New Haven, Connecticut 06515 • (203) 397-4234

March 19, 1985

DRAFT

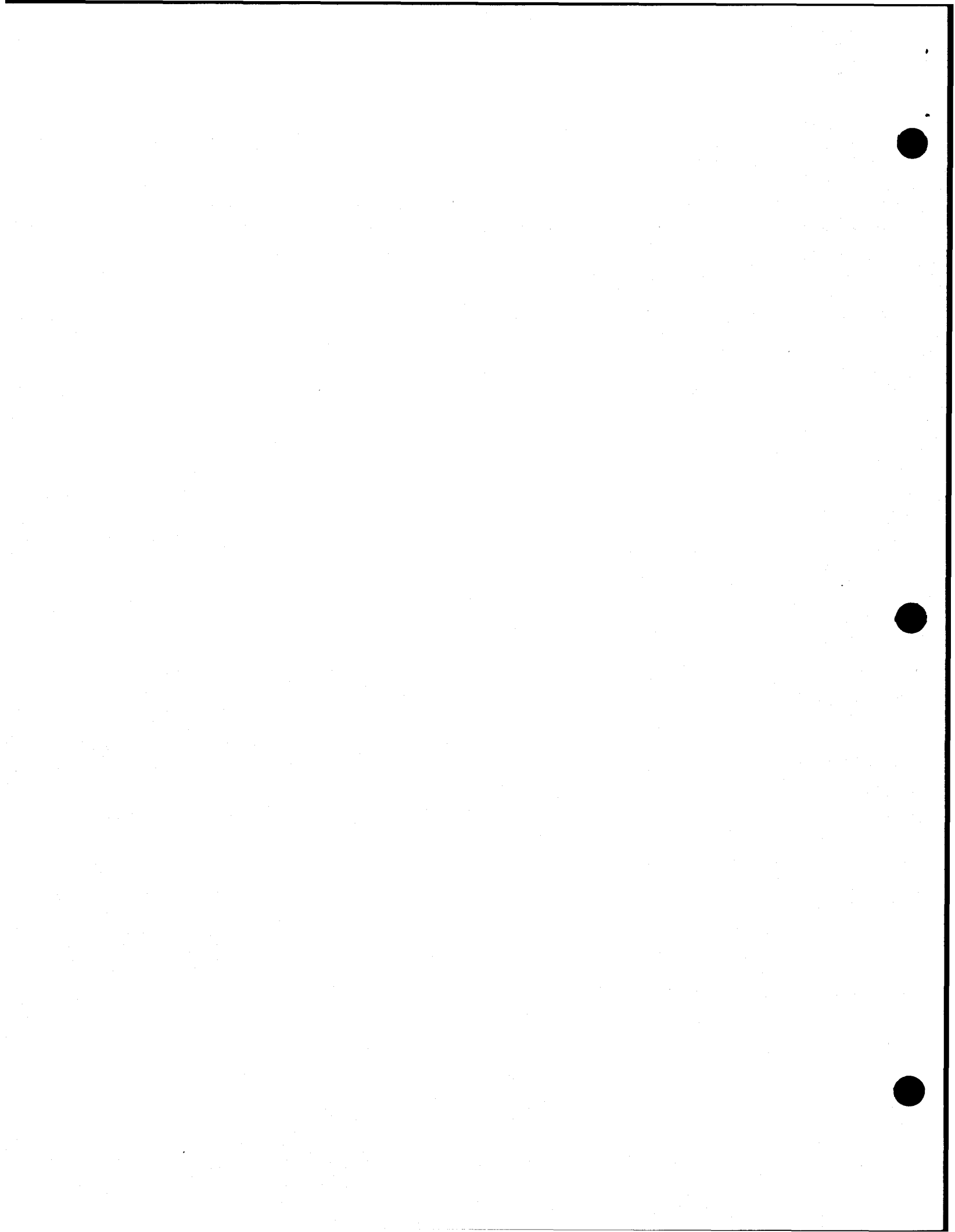
Dr. Ronald Panicci
Chemistry Department

Dr. A. Harris Stone
Elementary Education Department

Gentlemen:

This correspondence shall serve as official confirmation that the Institute for Science Instruction and Study (I.S.I.S.) will be administered by you consistent with the provisions of the "Fiscal and Personnel Considerations" (attached) and in accordance with the following conditions:

1. The budget (see "Fiscal and Personnel Considerations") must cover all expenses including salaries and wages, fringe benefits, overhead charges, and operating expenses.
2. All budget categories referred to in #1 will be reduced in proportion to the actual number of paying students as a ratio to 42 students upon which the budget will be based.
3. All revenues over expenditures in a fiscal year will be retained by the institution.
4. Upon termination of the Institute, all assets acquired will be titled in the name of the institution and used at its discretion.
5. No expenses or encumbrances will be made, including salaries and wages, until cash revenues have been received by the ISIS account.
6. The ISIS account must never fall into a deficit position.
7. All recommended major changes in the budget categories must be approved by the Vice President for Academic Affairs and the Vice President for Administrative Affairs.
8. At the end of the ISIS fiscal year, the directors will be responsible for submitting to the President an accounting of the year's fiscal activities. Such statement must be submitted no later than 30 days after the completion of the fiscal year.



Dr. Ronald J. Panicci
Dr. A. Harris Stone
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9. Termination of the Program by either party may be made upon 30 days' notice.

Sincerely,

Michael J. Adanti
President

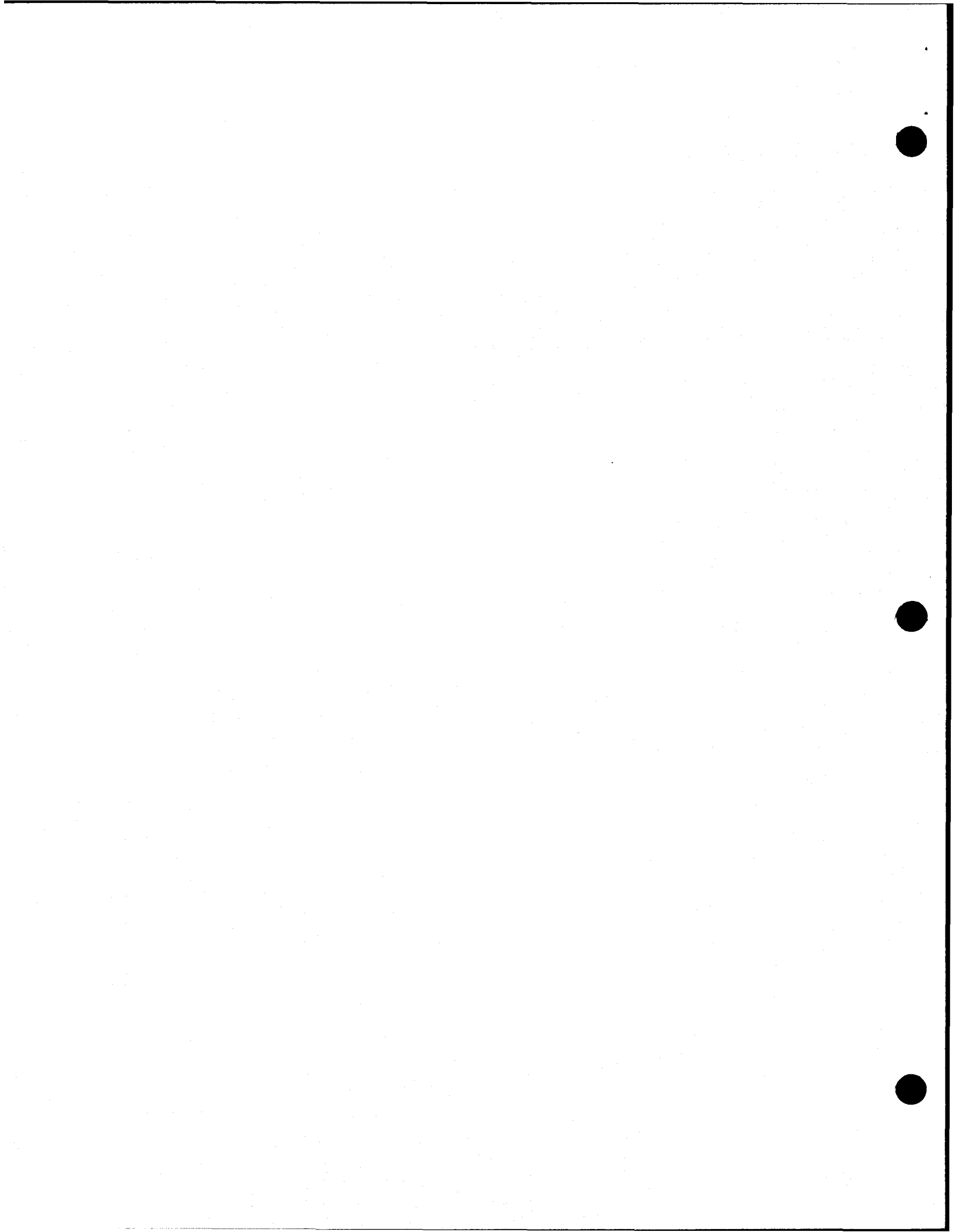
Please indicate your acceptance of these conditions by signing below.

Ronald J. Panicci, Professor
Chemistry Department

Date

A. Harris Stone, Professor
Elementary Education Department

Date



INSTITUTE FOR SCIENCE
INSTRUCTION AND STUDY

A POSITION PAPER AND
PRELIMINARY PROGRAM
DESIGN

Ronald Panicci, Chemistry
A. Harris Stone, Education

Southern Connecticut State University
New Haven
Connecticut
October 1, 1984
Revised January 2, 1985

Institute for Science
Instruction and Study

A Science Teaching Program

There is a long-standing and desperate need for a program which produces artful science teachers who have a significant impact on the learning of secondary school students. Recent advances in technology, medicine and related science fields have brought a resurgence of interest in science education. Both the government and the private sector have called for educational improvements in math and the sciences.

Since relatively few gifted young scientists become secondary school teachers, immediate improvements in science instruction can best be accomplished by those teachers already certified and employed in the schools. It is assumed here that developing, or rekindling, expertise in "real science" among secondary school science teachers will have the immediate and direct effect of improving science instruction for secondary students.

Herein, is proposed ISIS, Institute for Science Instruction Study, a science teacher program for the purpose of developing more effective science teachers by virtue of increasing their contact with real science and real scientists. It has been developed with the following assumptions as guidelines.

ASSUMPTIONS

1. The teaching of secondary science is best accomplished by those who *know* and *experience* science, and who are committed to science as a vital and ongoing process.
2. Continued learning by science teachers is facilitated by their direct contact with scientists who are on the "cutting edge" of knowledge and at the frontiers of research. Further, continued learning is more vigorous and impactful if these scientists are people of national and international stature.
3. The teaching of science demands appreciation and understanding of both the history and philosophy of science. Also imperative is an understanding of recent discoveries and current pathways of research as these can be interpreted in light of the history and philosophy of science.
4. The ability to create, to imagine, and to dream, are inseparable from science and necessary in the education of scientists.
5. Several times during a teacher's career, there is a need to update and extend both information and ideas.
6. There is a perceived need for an alternative Sixth Year Certificate program for *Teacher Specialists*, which is independent of the usual sequence of individual courses. Further, continuity in learning science is best achieved

within a carefully designed and integrated instructional program.

7. Intense learning environments tend to increase the impact of learning experiences. Hence, weekend and month-long programs of full-time study are appropriate for increasing teacher involvement in, and dedication to, scientific thought. Further, a variety of pedagogic techniques maximizes successful learning.
8. The responsibility for maintaining a high-level teaching competence is equally shared among individual teachers, the schools, the state and federal government, universities, and the science-oriented private sector.

GOALS

The obvious outcome of these assumptions are specific goals on and toward which the ISIS Institute will direct its energy. The goals are as follows:

1. To extend and increase each teacher's experience in areas of current science, as practiced by high quality, contemporary scientists. This goal extends to include the development of scientific knowledge in a variety of different scientific arenas, and to explore those current ideas which might be thought of as the new frontiers of scientific knowledge.

2. To increase each teacher's self-image as being "science able" and "science literate". This goal extends to include the involvement of each participant in a specific scientific study, which when successfully completed, will allow them to believe in their own ability as a "real scientist".
3. To extend teacher's understandings of contemporary science so that a) they may better evaluate curriculum materials; b) modify and improve science programs, and c) provide a sound science base for working with gifted and talented secondary science students.
4. To promote awareness of science in contemporary society. This goal extends to raising teachers' consciousness of the social, moral, ethical and philosophic issues of science as these relate to the practice of science in society.

PROJECT DESCRIPTION

The ISIS program consists of a series of evening lectures, weekend symposia, and four to five weeks of summer workshops (consisting of lecture and laboratory study) *in each of two years.* The Institute's staff will include faculty from universities, the area industrial and medical community, and nationally known scientists. In fact, an imperative component of ISIS is a faculty comprised of first-rate scientists bringing powerful intellectual concepts and significant scientific insights to the program. It is planned that two of the weekend symposia will be conducted by Nobel Laureates.

PROGRAM HIGHLIGHTS

The ISIS program involves twenty months of intense exposure to "state of the art science" in a broad range of scientific areas. During the first year, the focus will be more philosophic and technologic than experiential. In the second year more time will be devoted to laboratory experience and hands-on events. A special event will involve each participant in a week-long experience with a scientist mentor.

The second year will also require participants to establish a project in their own school system in which they work with "gifted and talented students". Their goal will be to develop "real science" learning situations involving students. Thus the process of transferring "scientific excitement", and improving science instruction will begin. Finally each teacher will prepare a presentation for the other ISIS participants describing their project and its outcome.

PROGRAM FORMAT

The environment in which ISIS will be presented has been designed to provide variety in both style of presentation, and content. The three modes of operation are described here with brief explanations of philosophy and purpose.

Evening Lectures:

The philosophic foundations of scientific thought will be explored with emphasis on the history of science; the human experience and motivation of scientists, and projections

concerning the future of science. The presenters of these issues will be noted scholars. The desired outcomes of these lectures include:

1. developing a theme on which the entire ISIS program will be founded;
2. establishing a sophisticated and serious level of thinking to serve as a standard throughout the program;
3. presenting anhistoric overview of the outcomes of scientific thought;
4. revealing the nature of processes leading to new and continued scientific thought;
5. establishing generalizations of "truth" which will serve as a basis for discussing specific issues;
6. expanding the notion of creative processes, and the conditions for creative thinking in science; and
7. providing a basis for projecting the "possible futures" of science.

Weekend Symposia

Total immersion in a clearly delineated theme will enable participants to explore specific issues and ideas in depth. Weekend symposia will begin on Friday afternoons and continue through Sunday afternoon; a time period in which a single theme will be explored through some combination of lectures, laboratory experiences, demonstrations, seminars, and small group discussions.

These symposia will place participants in close intellectual proximity with powerful scientific thinkers; including Nobel Laureates. The impact of their interactions will expand participants personal and academic potential, and provide a basis for increasing self-confidence. Finally, these symposia will greatly broaden the participant's scientific knowledge, understanding, and information base, as well as stimulating and promoting their own *process thinking*.

Summer Workshop

The summer workshops comprise an extensive array of contemporary scientific ideas, current knowledge and information, and estimates of future directions in scientific thought. These workshops will take place in continuous day-long sessions for four weeks in each of two summers. Laboratory experiences and scientific laboratory site visitations, together with lectures and seminars will involve participants in state of the art scientific investigations and research.

Each day's events will take place in an university, industrial, or bio-medical laboratory, or in such a setting as is appropriate to achieve the desired learning goal. The day-long workshops will feature 1) in depth learning in a specific area, 2) "hands-on" experience with appropriate laboratory materials and instrumentation, 3) and direct interaction with scientists and researchers. Topics and studies of these workshops will include issues in bio-medical research, fundamental physics, industrial and

commercial chemistry, (plastics, cosmetics, rubber products, agriculturals, metals, petrochemicals, and pharmaceuticals), computerized instrumentation and electronics, environmental science, field biology and natural history, meteorology/geology/astromony and associated topics, space science topics and applications, and nuclear physics. The major outcome of these workshops will be:

1. an accumulation of contemporary scientific ideas and information,
2. an understanding of current directions and topics of research,
3. an understanding of science and its operation/function in society,
4. an appreciation of the constraints and responsibilities of both scientists and the formal organizations within which they work, and
5. the direction and impact of contemporary science.

The final week of the second year places each participant in a special relationship with a working scientist-mentor. Participants will be matched with scientists on a common interest basis and spend a full week with their scientist-mentor in the scientist's work place. Each participant will have an opportunity to gain inspiration, insight, and evolution of self-thought. Successful completion of this "student-mentor" experience will provide both an immediate learning impact and fodder for long-term growth and thought.

PARTICIPANTS' PROFILE

Junior and senior high school teachers of the sciences are the target population of ISIS. These teachers must be committed to science as a way of thinking, and as a body of knowledge. They must be dedicated to teaching science as a way of helping students develop problem solving abilities, extend deductive reasoning skills, and foster creativity.

Teachers will be sought who have potential for personal growth, who understand the excitement and challenge inherent in scientific thought and discovery, and who appreciate the duality of the "dreamer-realist" nature of scientists. Also, these teachers must have the desire and potential to excite their own students and promote dynamic thinking. Finally, they must believe that their students have the same potential for scientific excitement and growth that they themselves possess. In short, people will be sought who have "those special gifts" that make them TEACHERS.

To be eligible for nomination, and acceptance as a participant in ISIS, a teacher must

1. have at least 30 credits in science courses (preference will be given to those with the best academic preparation in the sciences).
2. hold a master's degree in an area of science or education.
3. have several years experience teaching science in junior or senior high school.

4. be willing to make a commitment to
 - a) attending and participating in all phases of the program, and to do so in a wholehearted quest for understanding and growth
 - b) becoming extensively involved in the "gifted-talented" project phase of the program
 - c) improvement of their own teaching
 - d) dissemination of ideas and enthusiasm to their school colleagues; and
 - e) instituting new programs and courses in their schools

BENEFITS TO PARTICIPANTS

The most specific and dynamic benefits of ISIS accrue directly to the teacher participants. It is they who will be renewed and extended in their personal learning, their experience with real science and scientists, and their professional development. Their teaching will be measurably improved and from the inherent success of that experience, there will develop an internal sense of self-fulfillment and worth. More specifically, each participant who successfully completes this graduate program will be awarded the Sixth Year Certificate; Teacher Specialist in Science Education. This certificate will be accompanied by an uniquely annotated transcript describing in depth the nature, variety and extent of the specific elements and facets of the ISIS Program. It is expected that participating school districts will recognize this certificate as one appropriate for the teacher's advancement on the salary scale. Also,

this certificate will fulfill the professional development mandates of the State Certification Standards.

THE ROLE OF SCHOOL SUPERINTENDENTS

Vital to the success of ISIS is the academic and administrative support of the area secondary schools, and specifically the superintendents of schools. Their leadership, cooperation, and support will lead to

1. fulfilling the professional development needs of science teachers (P.A. 84-314).
2. immediate fulfillment of mandated programs for the gifted and talented (Special Act 83-85).
3. school program changes and improvements which will serve as models in disciplines other than science.

Each school district, through its superintendent, will be asked to participate in the ISIS Program by making the following commitments:

1. to nominate the science teachers, three of whom will be selected for this two-year program.
2. to provide academic, moral and attitudinal support and encouragement vital to each teachers success in this demanding and taxing program. This support includes providing a limited amount of released time for participation in Weekend Symposia (dismissal from duties at 1:00 P.M. on each of five (5) Friday afternoons in each of two years).
3. to encourage and support new teacher behaviors, and implementation of ideas that teachers will develop.

4. to financially support three teachers by providing direct payment equal to one third of their tuition. Over the two year period of ISIS, the total program cost per participant will be \$2,550.00. Each school district is required to provide funding of \$425.00 per participant, per year. (Please note that each teacher will also provide one third of their own tuition, and the remainder will be funded by SCSU through grants and matching contributions.)
5. to understand and accept that teachers who successfully fulfill the requirements of graduate study intrinsic to this program will receive the Sixth Year Certificate; Teacher Specialist in Science Education. It is assumed that receipt of this certificate will entitle teachers to advance both professionally and financially.

THE ROLE OF INDUSTRY

The participation of science-related industries is a fundamental component of ISIS, and one on which the program's success is based. It is clear that such industries are dependent upon successful science teaching in universities, which in turn are dependent upon the success of science learning in high schools.

Although the pathways to careers in science vary, it is clear that a stimulating and substantial science education will greatly benefit the entire scientific community. Hence, the ISIS program calls on Connecticut's science related

industries to make a commitment of support and participation. In fact, ISIS can only succeed if industry approves and strongly supports the program in the following ways:

1. to make available scientists and researchers who have expertise and extensive commitments in highly specialized and "cutting edge" areas of science. The most desirable scientists will be those with a commitment to education and a willingness to share their time and scientific insights.
2. to make available on a limited basis, access to facilities, laboratories and instrumentation as these may be appropriate and necessary for the ISIS program.
3. and finally, industry is asked to provide a portion of the financial support for participants in the ISIS Program. Please note that each of the 45 participants will pay 1/3 of the total cost by a direct tuition payment (\$425). In addition, the school districts from which the participants come will provide 1/3 of the total cost (\$425). Thus, the program will require support by grant from industry amounting to \$425 per participant per year.

In summary, the contribution from industry and grants for a two-year period, for 45 participants in the program, amounts to a total of \$38,250. It is the goal of the program directors to find not one, but several interested industries to support this program. We are of the view that such broad based support will be more

educationally productive than would be that of a single benefactor.

GENERAL OUTCOMES AND BENEFITS

The benefits of the ISIS program will be many and varied. The participants themselves will be "renewed" with a scientific fervor seen mostly in young scientists. They will interact with the scientific community in a personal way. By experiencing real and recent science, teacher participants will a) be remotivated in their own fields; b) acquire an enriched knowledge of technology, science and social values; and c) become more skilled and dynamic in their teaching. The result will be TEACHERS, with renewed self-images and increased levels of confidence in their science-related abilities.

It is clear that this program will allow school districts to fulfill a role which is usually difficult for them to achieve. The schools will provide leadership both in the improvement of science teaching and learning, and will promote professional development for teachers at a level heretofore unattainable. Further, this program will also serve as a model for other even more ambitious professional development endeavors in which the schools may join universities in cooperative efforts toward the rapid improvement of high quality teaching. Finally, the participant who receives the Sixth Year Certificate will also receive a transcript reflecting both the variety and depth of the topics studied. These certificate

holders will form a cadre of information and attitude disseminators who will be potential' leaders within their school districts.

PRELIMINARY PROGRAM OF EVENTS

INSTITUTE FOR SCIENCE
INSTRUCTION AND STUDY
(ISIS)

FIRST YEAR

- Evening Lecture #1 - Retrospective: "The Age of Science; Address" (Arthur Galston)
- Evening Lecture #2 - Science: A Human Experience (Harold Morowitz)
- Weekend Symposium #1- History and Philosophy of Science: The Past and Its Bearing on Modern Science (Kuslan, Aboe)
- Weekend Symposium #2- Philosophy of Science: The Future of Science (Kuslan, Futurist)
- Weekend Symposium #3- The Face of 21st Century Science: Impact of Change - Examples: gene splicing; biomedical research; "ownership of knowledge"; scientific research and the antiscience movement; etc.
- Summer Workshop #1 - Medical Research and Applications - Future Horizons (cancer, drugs - (YNH, Miles, Pfizer)
- Summer Workshop #2 and #3 - Measurement Techniques, Experimental Processes and Instrumental Methods of Analysis: infrared, ultraviolet, visible, nuclear magnetic resonance and mass spectrometry; atomic adsorption; chromatography; amino acid analysis; etc.; instrument construction (Perkin-Elmer)
- Summer Workshop #4 - Research and Basic Science in Long Island Sound; Avery Point (Bolen, Stewart, Fang, Weiss)
- Weekend Symposium #4- Weekend with a Nobel Laureate (J.D. Watson)
- Weekend Symposium #5- Learning REAL Science in the Field (Miesel, Proctor, Pelligrino)

SECOND YEAR

- Evening Lecture #1 - The Compulsion for Knowing: A Philosophic Position
- Evening Lecture #2 - Science: A Futurists Fantasy
- Weekend Symposium #1 - Research in the Natural Sciences: weather and its forces, hurricanes, tornados, control, etc.; geology and continental plates, volcanos, earthquakes; astronomy and the stars, planets, comets, meteors, black holes, quarks, etc:
- Weekend Symposium #2 - Computers in Science and Research
- Weekend Symposium #3 - Weekend with Four Noted Scientists Discussing Reserach and Development Directions until the Millennium and Beyond
- Summer Workshop #1 - Nuclear Science - The State of the Art
- Summer Workshop #2 - Science in Industry - the State of the Art (polymers, plastics, rubber, metals, electroplating, economics, agriculture, cosmetics) - (Olin, UniRoyal, etc.)
- Summer Workshop #3 - Space Science Research and Application (NASA, space station, telometry, etc.)
- Summer Workshop #4 - Weeklong Internship with a Scientist
- Weekend Symposium #4 - Weekend with a Nobel Laureate
- Weekend Symposium #5 - Project with Gifted and Talented Students; Presentations
- Weekend Symposium #5 - Project with Gifted and Talent Students; Presentations
- Evening Lecture #3 - Culminating Lecture by Science Philosopher with "Coach Mentality".

3. Program Presentation - The Pedagogy

The presentation of ISIS events is outlined as "Program Format" on page five of the proposal. Additional information presented here is related to 1) teaching/learning styles, and 2) time allocations on which credit is based.

It is intended that variety and appropriateness of teaching/learning styles, be governing issues in ISIS events. The program of events reveals that all topic areas of science are included in the design. These brief descriptions of topics will be expanded and developed as specific faculty participate in planning each event. To couple content with appropriate style of presentation the program will be offered in evening lecture formats, weekend symposia, and day long/week long combinations of lecture-laboratory-demonstration-and site visitation. Laboratories will be used for first-hand experience with unique instrumentation, for direct process learning specific to unusual content (i.e. in the history of science) and generally as needed for expanding special topics. Site visitations will allow learning and experience with "one-of-a-kind" instrumentation, experimentation, research, field natural history studies, earth/space/ and marine science research, and medical research. Discussion groups will focus on the content of lectures, and will be used for in depth study of special topics. Each faculty presenter, in concert with the directors, will determine the appropriate modes of presentation. Many presentations, particularly

those of Nobel Laureates and other eminent scientists, will be more effected by the intrinsic power of the person and the content than by the pedagogy.

In offering graduate credit, and a Sixth Year Certificate, an analysis of time and value must be made of program events (which could be called "curriculum"). The analysis technique for student learning is described later in this document. The commitment of time in the program is evaluated here and equated to standard graduate course clock hours as a basis for comparison. Total clock times within categories of presentation are listed here:

Evening Lectures: each of the five lectures will consist of 2 hours of lecture; 1 hour of questions, and 1 hour of small group discussion. The total time for this phase of the program is twenty hours.

Weekend Symposia: each of the eleven weekend symposia will consist of a 3 hour Friday evening lecture, and a Saturday sequence of lectures, demonstrations, discussions, laboratories and other learning activities for a total of seven daytime hours, and three evening hours. The total time for this phase of the program is one hundred and forty-three hours.

Week-long Workshops: each of the eight week long workshops will consist of five eight hour days of lectures, laboratories, site visitations, and conferences. The total time for this phase of the program is three hundred and twenty hours.

All phases of the program, *not* including tutorial sessions and individual conferences between participants and the "staff", total four hundred eighty three (483) clock hours. A comparison of time commitment in ISIS, to that of standard Sixth Year programs is in order. Ten graduate courses are generally required in sixth year programs with a total clock hour commitment of three hundred and seventy five hours. With 483 hours, ISIS clearly fulfills and exceeds the standard. Therefore, the assignment of thirty (30) graduate credits to those who successfully complete the program is justified.

4. Program Content and Faculty

Establishing the science content of ISIS was initially accomplished by surveying recent research topics and areas of high interest in many scientific journals. These topics were presented in a preliminary proposal to members of the four Science Departments at Southern Connecticut State University. The Chairpersons in Biology, Chemistry, Physics and Earth Science were invited to solicit input from all science faculty and to participate (with interested faculty) in a planning and development meeting (Fall 1984). A number of program changes and additions resulting from this meeting greatly improved the planned content. As ISIS presently stands, the content includes topics that can be described as "state of art", "cutting edge" and "real" science. There is active research and development in all of the content areas. Specifically, the content is reflected in the Preliminary Program of Events.

Faculty quality in ISIS is critical. All teaching faculty will be selected on two criteria. First, the person must have expertise in the scientific content. Second, they will be active in research, well known and/or published in their speciality, and active in the information network of the topic area. These criteria will be applied when seeking 1) faculty in our own and neighboring universities, 2) persons in the medical community, 3) persons in science based industry, and 4) scientists from a variety of other

sources including Science Digest's annual "America's
100 Brightest Scientists under 40"; Science 84's "20
Discoveries that Changed our Lives"; and annual listings of
various prizes and awards in scientific fields. Further,
two key presenters in the program will be Nobel Laureates
whose content expertise is obvious.

5. Participant Requirements

ISIS is a rigorous academic program requiring completion of a large variety of tasks and assignments. Foremost among these is mandatory attendance and involvement in all events and meetings of the program. Certainly illness or other critical situations will be accepted as a basis for absence, but the timeliness of the presentations dictates participation to facilitate learning. In fact, since most presentations will be by "visiting professors", or involve site visitations, it will be difficult to make up missed work. Also, the interaction among participants, and between presenters and participants, is an important part of the learning process which demands attendance.

Readings constitute a major segment of the learning process in ISIS. Prior to each presentation, the directors will provide participants with articles and other appropriate materials to prepare them for the event. Participants who need more background information or further understanding will be invited to participate in special study seminars.

In order to transfer the science learning, participants will be required to create, design and carry out a science based project with gifted and talented high school students. Each project will be discussed with and approved by the ISIS directors. The teachers will be encouraged to involve their high school colleagues in these projects, and to share with them the enthusiasm and new information garnered at ISIS meetings. A final report on the nature and success of

projects will take the form of a presentation to ISIS peers. A formal paper describing the project in detail also will be submitted.

All participants will be required to spend a week with a scientist-mentor. This event, the details of which will be recorded in the log, will also be evaluated by the participant in the form of a descriptive paper. The log, (described in the next section) is required of each participant during the entire ISIS Program.

6. Evaluation Processes

The ISIS program has an intricate and extensive set of evaluative processes. Taken together the various evaluating instruments and techniques will be used to continuously 1) assess student accomplishments within the program, 2) evaluate the design of the program (which evaluation will serve as a basis for continuous and immediate program change), and 3) be used to summarize and report each student's success in the program (on which the certificate granting will be based). Listed here are the various components of the evaluative process:

1. Entry Assessment. Upon entering the program all students will participate in two evaluative tests. Both will use a pre and post test, with a different form of the same test being administered at the end of the program. One test will focus on "understanding science" and will be designed after the TOUS tests, a standardized Test on Understanding Science. The second test will evaluate scientific literacy. The specific test for this purpose has not yet been chosen.
2. Participation Assessment. Throughout all phases of the program, student participation will be both strongly encouraged and continually assessed. This assessment will be carried on by the directors and will take the form of 1) annotated notations and 2) informal interview techniques. These evaluations will be used for the purpose of encouraging participation, for discovering areas of understanding or

weakness, and for assisting in special study seminars. These seminars will provide an opportunity to correct misinformation, to identify areas of weakness, and to supply extended learning experiences to correct those weakness.

3. Reading Assessment. The extensive readings required in this program will be evaluated for the purpose of reinforcing understanding, and to assure appropriate preparation for each learning event. The reading and the analysis of students' understanding will be done prior to the scheduled event.

4. Record of learning. Each student will be required to keep an up to date log throughout the ISIS program. This log will be provided as will be the format for its use. The primary purpose of the log is as a continuous personal record of learning. In this context students will keep all lecture notes, impressions and insights in the log. Moreover, the log will incorporate summary sheets prepared after each presentation. These summaries will describe (a) a statement of fundamental understandings (b) a statement of confusion, lack of understanding, and areas that need further development and (c) statements dealing with application of learning to the participants' own teaching. These assessment summaries will be reviewed by the directors immediately following each weekend, or week of events, and will be responded to with specific references for additional reading and/or conferences with the directors.

5. Scientist-Mentor Evaluation. At the end of the one week experience in which participants work with scientist-mentors, an evaluation will be made by the scientists. Further, each participant will present an assessment of learning.
6. Project Assessment. Each participant's "gifted and talented high school students" project will be presented in a formal setting to all program participants. Each presentation will be accompanied by a formal written description of the project, and of its outcome. This report will be evaluated by the directors.
7. Grading. Participants in this program will be graded according to a scheme of Honors, High Pass, Pass, Fail, Withdraw. This evaluation will be reported only once at the end of the program, and will appear as an overall summary grade on the annotated transcripts (see next section).
8. Annotated Transcripts. Due to the diverse nature of this program, it would be inappropriate for transcripts to merely list course numbers and abbreviated course titles. Therefore, it is planned to create a fully annotated and broadly descriptive statement delineating each phase of the program. This material, together with an overall grade as described in Item #7 above, will constitute the official transcript for ISIS participants. It will serve as documentation to substantiate granting the Sixth Year Certificate. The specific descriptions in the transcript will be prepared by the directors, and cooperatively with the participants, so as to insure the accuracy of the statements and the fact that they represent actual learning.

7. BIBLIOGRAPHY

The faculty responsible for each event will provide a list of papers, articles and other assignments in preparation for the specific presentation. These will be assigned readings to be completed prior to the event. In addition, assignments will be made of general readings from such journals as the New England Journal of Medicine, Science, Nature, Scientific American, Science Digest, Chemical & Engineering News, Journal of Analytical Chemistry, Journal of Biochemistry and other journals of equal import. Selections from appropriate text books also will be made as required.

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