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ABSTRACT

The project was to design, produce, and field test interactive video materials to increase junior high school student interest in physics and chemistry. A curriculum development team consisting of junior high school physical science students and teachers and university educators produced a seven-part videotape series entitled "The Hypothesizers." Rather than emphasize science content, activities were designed to motivate and to engage students in anticipating, analyzing, hypothesizing, writing, discussing, and testing science-related problems and solutions. Two experimental and two control groups of ninth-grade students, totalling 341 subjects, participated in a pretest-stimulus-posttest trial of the materials. Data were collected using a specially-designed high school course interest inventory. For physics, all students using the materials reported a significantly greater interest increase than students receiving no stimulus or a placebo. For chemistry, one of the two experimental groups reported a significant interest increase. (Author/MSE)

# Motivation Materials for Junior High School Physical Science

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## AASCU/ERIC Model Programs Inventory Project

The AASCU/ERIC Model Programs Inventory is a two-year project seeking to establish and test a model system for collecting and disseminating information on model programs at AASCU-member institutions--375 of the public four-year colleges and universities in the United States.

The four objectives of the project are:

- To increase the information on model programs available to all institutions through the ERIC system
- To encourage the use of the ERIC system by AASCU institutions
- To improve AASCU's ability to know about, and share information on, activities at member institutions, and
- To test a model for collaboration with ERIC that other national organizations might adopt.

The AASCU/ERIC Model Programs Inventory Project is funded with a grant from the Fund for the Improvement of Postsecondary Education to the American Association of State Colleges and Universities, in collaboration with the ERIC Clearinghouse on Higher Education at The George Washington University.

## Abstract

Although most students take one physical science course in junior high school, very few students elect to take at least one physics or chemistry course in senior high school. Therefore, the objective of this project was to design, produce, and field test interactive video motivation materials, to increase student interest in physics and chemistry. A collegial curriculum development team, consisting of junior high school physical science students and teachers working with university educators, was used to design and produce an entertaining seven-part video called "The Hypothesizers". Video activities emphasized motivation, rather than science content, and were designed to engage junior high school students in anticipating, analyzing, hypothesizing, writing, discussing, and testing science related problems and solutions. There were 341 ninth grade physical science students, comprising two experimental and two control groups, who participated in the pretest-stimulus-posttest field testing of the materials. Data was collected using a specially designed High School Course Interest Inventory. For physics, all students who used "The Hypothesizers" motivation materials reported significantly greater interest increase than students who received no stimulus or, a placebo stimulus. For chemistry, one of the two experimental groups reported a significant interest increase. In all, significant interest increase in physics and chemistry was reported for six of the eight hypotheses tested.

Motivation Materials

for

Junior High School Physical Science

While almost all junior high school students throughout the United States take one course in physical science, relatively few of these students elect to take at least one chemistry or physics course when they reach senior high school. For example, in the Charlotte-Mecklenburg Schools (CMS) only 37.8% of the high school students took at least one chemistry course in 1985-86. Likewise, in the state of North Carolina, only 34.8% of the high school students took a chemistry course. During the same year, one physics course was taken by only 7.0% of the CMS high school students and by only 9.9% of the North Carolina high school students.

A part of this low enrollment in physics and chemistry courses may be due to student perceptions such as: (a) Physics and chemistry are only for future scientists, doctors, and engineers, (b) physics and chemistry are not pertinent to everyday activities, (c) physics and chemistry are too theoretical to be practical, or (d) knowledge of physics and chemistry is reserved for the more academically inclined student. Perhaps, students lose interest—or never develop an interest—in the physical sciences before they reach senior high school. Whatever the reason, it is important that some of these stereotypes be dispelled and the gap closed between the many students taking physical science courses in junior high school and the few who elect physics and chemistry courses in senior high school.

Much of what has been written about viewer identification suggests that students, who view a film or video tape which stars attractive peer role models, are more likely to identify with the actors and, as a result, become mentally engaged and motivated by the visual presentation. While many materials are available to teach the content of physics and chemistry, relatively few educational materials have been developed for the expressed purpose of dispelling negative stereotypes and motivating student interest in physics and chemistry. Our goal was to alleviate some of these negative stereotypes and cause students to think positively about the study and use of physics and chemistry.

## Objectives

The primary objective of this project was to design, produce, and field test interactive video motivation materials, which would "speak" to junior high school students in an upbeat communication style about activities relevant to their daily experiences. The desired result was to increase student interest in taking high school physics and chemistry courses. It was essential that the videos have the following characteristics: (a) be informal, entertaining, and adolescent in style and content, (b) demonstrate the ubiquitousness of physics and chemistry, (c) illustrate that some knowledge of physics and chemistry is important and practical for everyone, and (d) illustrate a practical side of physics and chemistry which might save time, energy, pain, and money.

Curriculum Materials Development Process

To achieve the objective of developing stimulating, challenging, and interactive video materials, the project utilized a collegial curriculum development team consisting of junior high school students, junior high school teachers, and university educators (see Appendix A). Eight ninth grade physical science students were recruited from the Charlotte-Mecklenburg Schools to be creative team members and increase the likelihood that the video materials would be in tune with adolescent experiences and communication styles. Student team members consisted of four females and four males, of which two were minority members.

To provide assurance that the end product would relate also to teacher concerns and responsibilities, four ninth grade physical science teachers were recruited from the Charlotte-Mecklenburg Schools to play key roles in the planning, production, implementation, and evaluation phases of the project. The four teachers on the materials development team included three female and one male, of which two were minority members. They were all full-time teachers with physical science as their primary teaching responsibility. In addition to their roles in writing the s s, the teachers worked with the university consultants in designing the teacher's manual and the student printed materials. An important role of the students and the teachers was to provide continuous built-in review of the curriculum development process and product.

The university educators consisted of an education professor (project director), an English professor (associate director), two science professors, and a speech and drama lecturer. The director and associate director were responsible for coordinating activities with the local school system, recruiting students and teachers, directing and coaching the script writing process, production and post-production video directing, field testing of the video materials, financial management, and administrative functions. The two scientists provided physics and chemistry consultation to the script writing and production teams. The speech and drama coach coordinated props and talent, coached student performers, and coordinated the writing team responsible for the teacher's manuals and the student hand-outs.

The script-writing phase of the project consisted of: (a) leading students through a series of exercises searching for physical science applications in everyday student activities, (b) exploring what students like and dislike about physical science, (c) developing visual descriptions of science-related problems, (d) asking classmates how they would solve problems, and (e) writing scripts of successful and unsuccessful solutions using youth-oriented drama and humor. Student scripts were then refined and organized into traditional video script formats using script-oriented word processing facilities.

The majority of the designing, writing, and video production activity took place at The University of North Carolina at Charlotte and at selected community and school locations. The University provided appropriate office, classroom, and laboratory spaces, as well as library-media resources and computer and word processing facilities.

Each junior high school student team member was responsible for writing a script and was also cast in the lead role for the video production of their script. Other students, teachers, and individuals played supporting roles. To maximize spontaneity, there was a deemphasis on advanced memorization of scripts and rehearsal for performing roles. Through words and modeling, the drama coach created appropriate moods and settings for the student actors to dramatize the science related problems and solutions, with the students' using their own words, styles, actions, and feelings.

Charlotte's community-owned public television station, WTVI, was contracted to provide mobile and studio production facilities, editing and engineering facilities, as well as, technical personnel to produce video tapes of aesthetic and technical quality (see Appendix A). Two technical video directors from the local public television station, along with camera operators and audio personnel, participated in approximately seven weeks of on-location video recording. Post-production editing was a meticulous job involving the selection, arranging, and combining of hundreds of video and audio segments. The total editing and assembly process required approximately five weeks (see Appendix B).

## Field Testing of Motivation Materials

"The Hypothesizers" physical science motivation materials were field tested in the fall semester of 1985. The 341 students participating in the field study were enrolled in ninth grade physical science classes in 12 geographically diverse schools in the Charlotte-Mecklenburg School System. (It should be noted for group

equivalency purposes, practically all CMS students take a physical science course in the ninth grade, and that the school system uses a balanced pupil assignment plan.) Approximately 43% of the students were male and 57% were female. The 341 ninth grade students were divided into the following groups for the field study:

Group I - This was an experimental group which consisted of four classes (84 students) who used the motivation materials and were taught by a member of the materials development team.

Group II - This was an experimental group which consisted of four classes (99 students) who used the motivation materials and were taught by a non-member of the materials development team.

Group III - This was a control group which consisted of four classes (95 students) who used no stimulus materials and were taught by a non-member of the materials development team.

Group IV - This was a control group which consisted of three classes (63 students) who used placebo materials and were taught by a non-member of the materials development team.

Since the curriculum development component of the project utilized the services of eight students who had completed ninth grade physical science the previous year, none of these students were included in the field test. Group IV was reduced from four to three classes when one class of 19 students did not return posttest surveys. Due to student

absences, on pretest and posttest days, 66 out of the original 407 students did not complete one of the two interest rating instruments and were, therefore, not included in the final data analysis. The 66 absences represent an absence rate of approximately 8%. This percentage is comparable to the overall CMS absence rate for that period of time.

Research Hypotheses

The following hypotheses were explored in the study:

Hypothesis 1 - The student group using the interactive video motivation materials and taught by teachers who were members of the materials development team (Group I) will have a significantly higher interest score in chemistry than the group receiving no special stimulus (Group III).

Hypothesis 2 - The student group using the interactive video motivation materials and taught by teachers who were members of the materials development team (Group I) will have a significantly higher interest score in chemistry than the group viewing the placebo materials (Group IV).

Hypothesis 3 - The student group using the interactive video motivation materials and taught by teachers who were not members of the materials development team (Group II) will have a significantly higher interest score in chemistry than the group receiving no special stimulus (Group III).

Hypothesis 4 - The student group using the interactive video

motivation materials and taught by teachers who were not members of the materials development team (Group II) will have a significantly higher interest score in chemistry than the group viewing the placebo materials (Group IV).

Hypothesis 5 - The student group using the interactive video motivation materials and taught by teachers who were members of the materials development team (Group I) will have a significantly higher interest score in physics than the group receiving no special stimulus (Group III).

Hypothesis 6 - The student group using the interactive video motivation materials and taught by teachers who were members of the materials development team (Group I) will have a significantly higher interest score in physics than the group viewing the placebo materials (Group IV).

Hypothesis 7 - The student group using the interactive video motivation materials and taught by teachers who were not members of the materials development team (Group II) will have a significantly higher interest score in physics than the group receiving no special stimulus (Group III).

Hypothesis 8 - The student group using the interactive video motivation materials and taught by teachers who were not members of the materials development team (Group

II) will have a significantly higher interest score in physics than the group viewing the placebo materials (Group IV).

Interest Inventory

The two experimental groups and the two control groups in this study used a pretest and posttest instrument designed for student rating of interest in enrolling in various high school academic subjects. The locally designed interest inventory resembled course registration checklists, and requested that students rate their interest (on a scale of 0 to 3) in enrolling in 30 different high school courses, including physics and chemistry (see Appendices C and D). "Zero" represented the lowest interest end of the scale and "three" represented the highest interest end of the scale. To reduce the possibility of students' associating the interest inventories with the science motivation videos, the pretests and posttests were distributed and administered through a school system office different from the office coordinating the distribution and use of the video motivation materials.

Stimulus Materials

The stimulus materials used by Groups I and II consisted of the specially developed 42 minute video, "The Hypothesizers", which was designed and produced by the materials development team. A teacher's manual and student analysis and hypothesis sheets accompanied each video tape. The science motivation video presented seven problem situations with four hypothetical solutions for each problem. Students in Groups I and II viewed the video problems. After each problem was viewed, the students proceeded to analyze, discuss, hypothesize, and write their own

science related solutions to each problem. When the students had created and written their hypothetical "solutions", they tested frequently suggested hypotheses by viewing the four video solutions depicting acceptable and unacceptable solutions to each problem. Students and teachers discussed the scientific implications of both the successful and unsuccessful "solutions" (see Appendix E). No stimulus materials were used with Group III and placebo video materials were used with Group IV.

## Procedure

The video motivation materials were field tested in ninth grade physical science classes in the Charlotte-Mecklenburg School system. Two experimental groups and two control groups were administered the pretest interest inventory in their physical science classes during the last half of the fall 1985 semester. Approximately two weeks after the pretest, teachers and students of Groups I and II used "The Hypothesizers" video motivation materials in their physical science classes. Group I was taught by teachers who had participated in the curriculum materials development phase of the project while Group II was taught by teachers who had not participated in the video stimulus materials development project. During the same time period, Group III received no special stimulus and Group IV used a placebo video tape. Both Group III and Group IV were taught by teachers who had not participated in the materials development project. Approximately two weeks after "The Hypothesizers" stimulus materials were used by Groups I and II and the placebo video materials were used by Group IV, the posttest interest inventory was administered to all students in the two

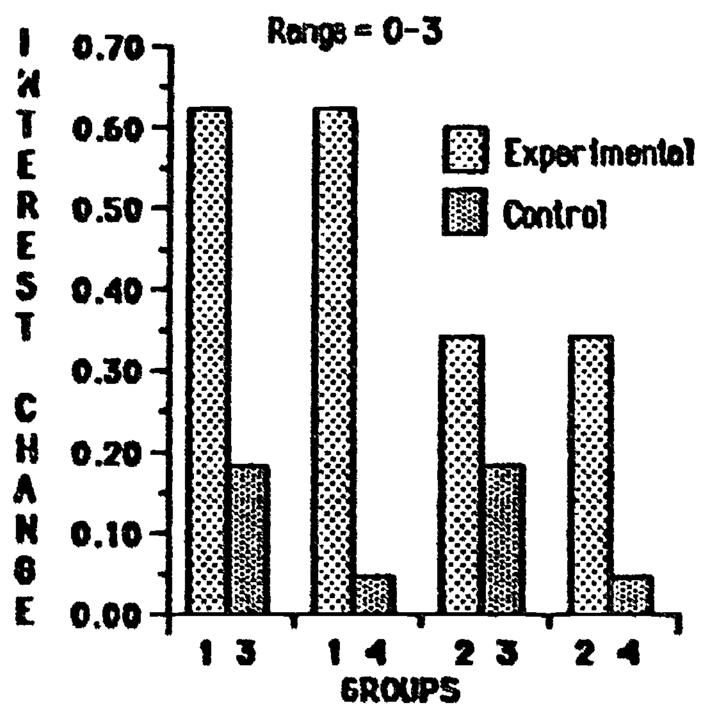
experimental groups and the two control groups. The data from the pretests and the posttests was used to assess changes in student interest in physics and chemistry courses. Calculations were made to determine the numerical difference in pretest-posttest interest ratings of chemistry and physics for each student. The group mean difference was then calculated for each of the two experimental groups and the two control groups for both chemistry and physics.

## Results

A paired-difference t test was used to measure the significance of the mean difference in physics and chemistry interest increase for the two experimental groups that had used the specially developed motivational materials, and the two control groups that had used no special treatment materials or had used only the placebo materials (see Appendix F).

The data for chemistry interest increase is represented in Figure 1 below.

Figure 1. CHEMISTRY INTEREST CHANGE



As predicted, the results for Hypothesis 1 did reflect a significantly greater interest increase in chemistry for Group I, the student group using the interactive video stimulus materials and taught by teachers who were members of the materials development team ($\overline{X}d$ =.321), than for Group III, the group receiving no special stimulus ($\overline{X}d$ = -.116), $t(179) = 2.82$, $p<.05$.

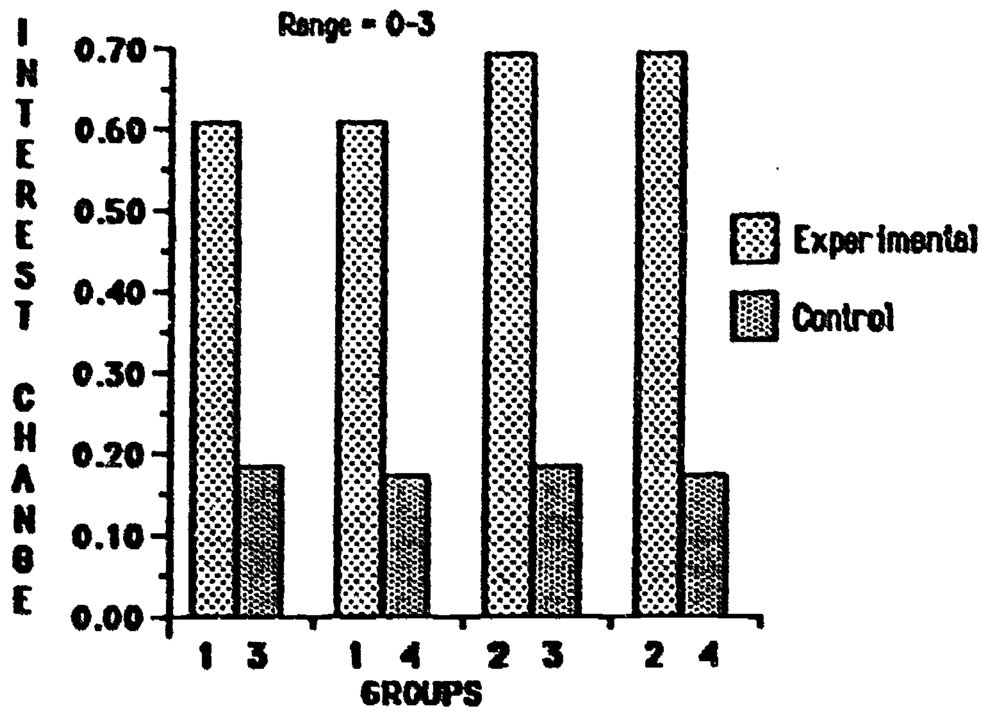
Results for Hypothesis 2 also reflected a significantly greater interest increase in chemistry for Group I, the student group using the interactive video stimulus materials and taught by teachers who were members of the materials development team ($\overline{X}d$ = .321), than for Group IV, the group viewing the placebo materials ($\overline{X}d$ = -.254), $t(147) = 3.22$, $p<.05$.

However, results for Hypothesis 3 did not reflect a significantly greater interest increase in chemistry for Group II, the student group using the interactive video stimulus materials and taught by teachers who were not members of the materials development team ($\overline{X}d$ = .040), than for Group III, the group receiving no special stimulus ($\overline{X}d$ = -.116), $t(194) = 1.09$, $p>.05$.

Likewise, results for Hypothesis 4 failed to reflect a significantly greater interest increase in chemistry for Group II, the student group using the interactive video stimulus materials and taught by teachers who were not members of the materials development team ($\overline{X}d$ = .040), than for Group IV, the group viewing the placebo materials ($\overline{X}d$ = -.254), $t(160) = 1.64$, $p>.05$.

As shown in Figure 2 below, the data for physics interest change represent a significant increase in interest for the remaining four hypotheses.

Figure 2. PHYSICS INTEREST CHANGE




The results for Hypothesis 5 reflected a significantly greater interest increase in physics for Group I, the student group using the interactive video stimulus materials and taught by teachers who were members of the materials development team ($\overline{X}d$ = .310), than for Group III, the group receiving no special stimulus ($\overline{X}d$ = -.116), $t(179) = 3.07$, $p < .05$.

For Hypothesis 6, the results also reflected a significantly greater interest increase in physics for Group I, the student group using the interactive video stimulus materials and taught by teachers who were members of the materials development team ($\overline{X}d$ = .310), than for Group IV, the group viewing the placebo materials ($\overline{X}d$ = -.127), $t(147) = 2.43$, $p < .05$.

Additionally, results for Hypothesis 7 revealed a significantly greater interest increase in physics for Group II, the student group using the interactive video stimulus materials and taught by teachers who were not members of the materials development team ($\overline{X}d$ = .394), than for Group III, the group receiving no special stimulus ($\overline{X}d$ = -.116), $\underline{t}(194) = 3.40$, $\underline{p}<.05$.

Results for Hypothesis 8 also reflected a significantly greater interest increase in physics for Group II, the student group using the interactive video stimulus materials and taught by teachers who were not members of the materials development team ($\overline{X}d$ = .394), than for Group IV, the group viewing the placebo materials ($\overline{X}d$ = -.127), $\underline{t}(162) = 2.89$, $\underline{p}<.05$.

## Conclusions

The data supported Hypotheses 1, 2, 5, 6, 7, and 8 confirmed that the use of motivation video materials could significantly increase student interest in physics and chemistry. No significant difference was found at $\underline{p}<$ for Hypotheses 3 and 4. Further analysis of the data, however, ied that interest did increase at $\underline{p}<.075$ and $\underline{p}<.10$ respectively, for Hypotheses 3 and 4. The less significant increase in chemistry interest might be related to the fact that 37.8% of the CMS students presently take at least one high school chemistry course, as compared to only 7.0% who take at least one physics course. Chemistry interest may have been about 30% higher than physics interest to begin with, and therefore had less latitude for possible increase.

Summary

There were three important curriculum and instruction features employed in the development of the physical science motivation materials, "The Hypothesizers". These features were: (a) a collegial curriculum development team approach, (b) science from a peer perspective, and (c) an interactive instructional design. The data of the present study supports all four of the experimental hypotheses that students who used "The Hypothesizers" motivation materials would report significantly higher interest in enrolling in high school physics courses than student who used no special stimulus materials, or used placebo materials. Further, two of the four experimental groups who used the motivation materials reported a significant interest increase in chemistry, while the remaining two experimental groups reported an interest increase at nearly the desired level of significance.

"The Hypothesizers" is the product of a materials development project which employed a collegial curriculum development team approach by including students, teachers, educators, and scientists in the creation, design, and production. The project also drew upon student perspective to capitalize upon unique adolescent communication styles and content. Furthermore, the project employed an interactive instructional design to stimulate science related analyzing, synthesizing, hypothesizing, and experimenting by students and teachers. This materials development model appears to hold potential for the development of additional motivational materials for the physical sciences as well as other disciplines. Further research is needed to examine the relative influence of the key features of the instructional

materials design and production strategies employed in the development of "The Hypothesizers" motivational materials. This type of information could help, not only increase student interest in physical science, but also sensitize teachers and students to instructional strategies employed in emerging educational technologies. Future science education materials development projects could effectively utilize this collegial curriculum development model, the youth-oriented content and communication style, and the interactive instructional design, for the development of rapidly emerging laser video disk materials.

The project director and team members have given presentations and demonstrations of "The Hypothesizers" motivation materials to several science teacher groups (see Appendices G and H). Videotapes and teacher manuals have been provided to the Charlotte-Mecklenburg School system for duplication and system-wide distribution. Materials have been sent to the North Carolina Department of Public Instruction-Division of School Television for consideration for state-wide distribution, and to the National Science Foundation. "The Hypothesizers" motivation materials are available through the project director (see Appendix G).

# APPENDIXES

## Appendix A

### "THE HYPOTHESIZERS" MATERIALS DEVELOPMENT TEAM

University of North Carolina at Charlotte

Project Director-Producer......................Dr. Dorlan Mork

Writing Consultant.............................Dr. Boyd Davis

Science Consultants.............Drs. Tom Cassen & Mike Corwin

Acting and Staging Coach........................Charlynn Ross

Assistant to the Director.....................Arny Pickholtz

Charlotte-Mecklenburg Schools

Science Coordinator...........................Charles Vizzini

J.H. Science Teachers......Brooksetta Davidson, Mary Kincaid, Robert Lemmon, Gail Morse

J.H. Student Writers and Performers....David "Arthur" Baker, "Ellen" Miller, "Jennifer" Davis, "Chad" Neal, "David" Ferriss, "Paulanda" Scott, "Kenya" Little, "Michael" Young

Public Television Station WTVI

Administrative Liaison......................Elliot Sanderson

Technical Directors.................Bill Barnes and Tom Klip

Technical Assistants........Kim Cook, Burrel Brooks, Randy Fulp, Katherine Goodson, Steve Saxon, Chris Cortes, Mike Rickert, Wray Ware

Appendix B

PROJECT PLANNING, DESIGN, AND PRODUCTION SCHEDULE

| | |
|---|---|
| September 11, 1984 | Notified of NSF funding of project. |
| October-December, 1984 | Refined project plan and developed recruiting materials. |
| January-February, 1985 | Advertised, recruited, and selected physical science students and teachers. |
| March-June, 1985 | Conducted Saturday orientation, planning, and writing sessions. |
| June-July, 1985 | Conducted six-week video production workshop at UNCC, WTVI, and other required locations. Developed training, documentation, and evaluation materials. |
| July-August, 1985 | Performed post-production editing and assembly of master tapes. |
| September-October, 1985 | Duplicated video tapes and refined training and evaluation materials. |
| November-December, 1985 | Collected student pre-test data. |
| December, 1985 | CMS physical science classes used video tapes in the field study. |
| January-February, 1986 | Collected student post-test data. |
| March-June, 1986 | Analyzed field study data and prepared final report. |
| June-July, 1986 | Revised motivation materials and sent sets to Charlotte-Mecklenburg Public Schools and North Carolina Department of Public Instruction - Television Division. |
| July, 1986 | Submitted final report and materials to the National Science Foundation. |

## Appendix C

### HIGH SCHOOL COURSE INTEREST INVENTORY (Pretest)

I am conducting a survey of student interest in several high school courses and would appreciate your assistance. Would you please rate your interest in enrolling in the following high school courses. Use the rating scale below. This is only a survey and will not in any way affect your grades, student records, or future course schedules. Thank you for your help.

Student Name ______________________ Female _____ Male _____

Teacher ______________________ Class Period _______

School ______________________

**Rating Scale**

0 = No Interest
1 = Low Interest
2 = Moderate Interest
3 = High Interest

**LANGUAGE ARTS**

___ English

___ American Literature

___ Creative Writing

___ Business Communications

___ Speech/Debate

**SOCIAL STUDIES**

___ World History

___ Psychology

___ Current Affairs

___ American Politics

___ Economics

**SCIENCE**

___ Astronomy

___ Chemistry

___ Geology

___ Physics

___ Biology

**MATHEMATICS**

___ Geometry

___ Computer Science

___ Calculus

___ Algebra

___ Statistics

**FOREIGN LANGUAGE**

___ French

___ German

___ Spanish

___ Latin

___ Russian

**FINE ARTS**

___ Painting

___ Technical Theater

___ Photography

___ Dance

___ Acting

## Appendix D

### HIGH SCHOOL COURSE INTEREST INVENTORY (Posttest)

Several weeks ago you completed a course interest survey for me. To complete my study, I would again appreciate your help in completing a similar survey rating your present interest in enrolling in the following high school courses. Use the rating scale below. Like the last request, this is only a survey and will not in any way affect your grades, student records, or future course schedules. Thank you for your help.

Student Name ______________________________ Female _____ Male _____

Teacher ________________________ Class Period ________

School ______________________________________

**Rating Scale**

0 = No Interest
1 = Low Interest
2 = Moderate Interest
3 = High Interest

**LANGUAGE ARTS**

___ English
___ American Literature
___ Creative Writing
___ Business Communications
___ Speech/Debate

**MATHEMATICS**

___ Geometry
___ Computer Science
___ Calculus
___ Algebra
___ Statistics

**SOCIAL STUDIES**

___ World History
___ Psychology
___ Current Affairs
___ American Politics
___ Economics

**FOREIGN LANGUAGE**

___ French
___ German
___ Spanish
___ Latin
___ Russian

**SCIENCE**

___ Astronomy
___ Chemistry
___ Geology
___ Physics
___ Biology

**FINE ARTS**

___ Painting
___ Technical Theater
___ Photography
___ Dance
___ Acting

Appendix E

INTERACTIVE DESIGN

# "THE HYPOTHESIZERS"

**An Interactive Video**
**Science Motivation Program for**
**Junior High School Physical Science**
**(Interactive Process Sequence)**

VIEW THE VIDEO INTRODUCTION AND THE FIRST VIDEO PROBLEM

STOP

STUDENTS ANALYZE PROBLEM

STUDENTS WRITE

1. A STATEMENT OF THE PROBLEM
2. THE CAUSE OF THE PROBLEM
3. A PROPOSED SOLUTION TO THE PROBLEM

DISCUSS THE PROBLEM AND ITS CAUSE

ASK HOW MANY STUDENTS CHOSE VIDEO SOLUTION #1

VIEW THE SELECTED VIDEO SOLUTION

STOP

DISCUSS THE IMPLICATIONS OF THE VIDEO SOLUTION JUST VIEWED

**REPEAT THIS INTERACTIVE SEQUENCE FOR THE REMAINING VIDEO PROBLEMS AND SOLUTIONS**

Appendix F

STUDENT INTEREST DATA

Chemistry

| H | Group | N | $\overline{X}d$ | s | df | $\alpha$ | t Obs |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 84 | 0.3214 | 1.0336 | 177 | 0.05 | 2.82 |
| | 3 | 95 | -0.1158 | 1.0352 | | | |
| 2 | 1 | 84 | 0.3214 | 1.0336 | 145 | 0.05 | 3.22 |
| | 4 | 63 | -0.2539 | 1.0621 | | | |
| 3 | 2 | 99 | 0.0404 | 1.0587 | 192 | 0.05 | 1.07 |
| | 3 | 95 | -0.1158 | 1.0352 | | | |
| 4 | 2 | 99 | 0.0404 | 1.0587 | 160 | 0.05 | 1.64 |
| | 4 | 63 | -0.2539 | 0.0461 | | | |

Physics

| H | Group | N | $\overline{X}d$ | s | df | $\alpha$ | t Obs |
|---|---|---|---|---|---|---|---|
| 5 | 1 | 84 | 0.3095 | 1.0596 | 177 | 0.05 | 3.07 |
| | 3 | 95 | -0.1157 | 0.9545 | | | |
| 6 | 1 | 84 | 0.3095 | 1.0596 | 145 | 0.05 | 2.43 |
| | 4 | 63 | -0.1269 | 1.1126 | | | |
| 7 | 2 | 99 | 0.3939 | 1.1595 | 192 | 0.05 | 3.4 |
| | 3 | 95 | -0.1157 | 0.9545 | | | |
| 8 | 2 | 99 | 0.3939 | 1.1595 | 160 | 0.05 | 2.89 |
| | 4 | 63 | -0.1269 | 1.1126 | | | |

## Appendix G

### MOTIVATION MATERIALS ANNOUNCEMENTS AND DEMONSTRATIONS

Following are examples of professional presentations of the interactive video motivation materials titled, "The Hypothesizers":

October 22, 1985 - Presented and demonstrated the first showing of the motivation materials to faculty and administrators of the University of North Carolina at Charlotte, teachers and administrators from Charlotte-Mecklenburg Schools, representatives of Public Television Station WTVI, and junior high school students and teachers who participated in the project, Charlotte, N.C.

November 8, 1985 - Presented Science Motivation Project to N. C. Science Teachers Association annual convention, Raleigh, N.C.

April 9-10, 1986 - Demonstrated motivation materials at a Child and Family Development Conference at the University of North Carolina at Charlotte, Charlotte, N.C.

March 19-21, 1986 - Demonstrated motivation materials at the 1986 Convention of the North Carolina Educational Media Association, Greensboro, N.C.

May, 1986 - Announced materials project and availability information in the North Carolina Educational Media Association Newsletter.

June and July, 1986, 1987, 1988, 1989 - Presented Science Motivation Project to North Carolina and Southeastern science teachers in a workshops at the North Carolina School of Science and Mathematics, Durham, N.C.

March, 1987 - Presentation of motivation materials to the National Science Teachers Association, Washington, D.C.

January, 1988 - Presentation titled, "Designing Video Materials for Student Interaction and Motivation". Association for Educational Communications and Technology, Atlanta, Georgia.

"The Hypothesizers" motivation materials, can be purchased by contacting Dr. Dorlan Mork, College of Education, University of North Carolina at Charlotte, Charlotte, N.C. 28223. The cost of one set of materials is $50 for 1/2" VHS or 3/4" U-formats video tape. Please make checks payable to: UNC Charlotte College of Education.

Appendix H

MOTIVATION MATERIALS WORKSHOP - TEACHER COMMENTS
North Carolina School of Science and Mathematics

My students would love this. I can visualize it stimulating discussion among my lower level students as well as being open ended for my G/T students. I hope an update will be made after this "now" language, dress, music are no longer "in". - C. Warshaw

Very enjoyable video. It has what today's youth can relate to (music, job situation, etc.). There should be more of this in other subject areas as well. - A. Pope

"The Hypothesizers" allows students of all ages to define a problem and discuss various solutions which they would use to solve these. It allows students to think through and apply solutions to everyday use. - M. Wyatt

I think this video is long overdue! Now, can we make provision for all students to benefit from it? - B. Bronwell

This is a great project! I love how it teaches process thinking along with generation of interest in science. I know my students will eat it up! Thanks for doing this. - C. Fikes

I wish I could be as interesting as this video is. - J. Hifong

I enjoyed the video immensely. It was very mind gripping and could be adapted to any age level. I liked the students involvement in designing and participating in the actual video. - T. Bailey

For years I have been searching for a solution to allow my students to really enjoy coming to my science classroom. Finally, your video has arrived! - W. Roger

Great! I think kids will love it! The idea that science is really used everyday is so important for them to realize. - B.Shoenberger

Excellent program. I work with adults in a male prison system and I feel that this would be useful even with this group. They would love the music, problems, etc. - S. Charles.

"The Hypothesizers" has certainly caught my attention. I plan to buy one for my classroom and share it with fellow teachers. I am impressed with this fun approach to science. It's like a breath of fresh air in the classroom! Thanks! - K. Gerichten

This project is so exciting to me, for I am interested in positive, active, science lessons. I will be able to use this video with my students for motivation, excitement, and career orientation. - N. Webb

New--exciting--superb! I want to order my own tape now. So sorry all teachers of science couldn't see this presentation. - N. Yount