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IDENTIFIERS	*Informal Education; *Parent Child Program

ABSTRACT

As an effort to supplement the science which is taught in schools, this document describes the development and implementation of five out-of-school short courses for middle school children and their parents. The courses meet on Saturdays for five weeks and are intended to be taught at informal science learning sites such as zoos, science museums, nature centers and planetariums. Course activities are intended to increase the scientific knowledge of the participants as well as time that parents and children spend with each other. All of the courses also contain home activities for parents and children to do together. The first section of this document includes the history of this project, the rationale for selecting the courses, and a synopsis of the courses. The courses described are: (1) animal behavior; (2) building telegraphs, telephones, and radios; (3) microcomputers; (4) nighttime astronomy; and (5) winter study. A section on "administrative organization" discusses teaching sites, scheduling, participant registration, publicity and cost. Another section, "instructional organization," explains the teacher's guides, planning considerations and evaluation processes. Appendices include sample publicity brochures, newspaper articles, confirmation letters, a certificate of participation, and references. (TW)

OUT-OF-SCHOOL SCIENCE LEARNING EXPERIENCES FOR PARENTS AND THEIR MIDDLE SCHOOL CHILDREN

OUT-OF-SCHOOL SCIENCE LEARNING EXPERIENCES FOR PARENTS AND THEIR MIDDLE SCHOOL CHILDREN

INTRODUCTION

Background

The University of Minnesota, with financial support from the National Science Foundation DISE program (Grant #07872), has developed five courses for parents and their children who are enrolled in grades six, seven or eight. The courses function as experimental models focusing on parents and children learning science together. One or both parents participate with their middle school children.

The science content taught in these courses is intended to supplement the science taught in schools, and is designed to be presented at a level that both the middle school children and their parents can appreciate. The courses, which are five weeks long, usually meet on saturday mornings (except for an astronomy course which meets in the evening). They are intended to be taught at informal science learning sites such as zoos, science museums, nature centers, and planetariums. The microcomputer course, however, has been taught mainly in school classrooms on Saturday.

Course activities are designed to increase the scientific knowledge of the participants as well as the time that parents and children spend with each other. All courses contain home activities for parents and children to do together.

Rationale for Parent/Child Courses

There has been an overall decline in scientific knowledge at all ages sampled over the past decade, as indicated by results from National Science Assessment instruments. Teaching courses to middle school children and their parents attempts to increase scientific awareness for two different age levels

at the same time.

There are several reasons for focusing on middle school children in this project. It is difficult to teach the subject matter of science in a manner that is both interesting and profitable to primary school aged children and their parents simultaneously. On the other hand many high school students who are interested in science have jobs in the evenings or on weekends and have already been exposed to the more specialized sciences (i.e., biology, chemistry, physics) in their high school science programs. Thus, middle school children seem a natural choice for courses involving learning experiences for parents and children.

It is shortly after the middle school years that students will elect to include or exclude science courses in their high school course choices. At the present time, large numbers of students are choosing not to take science courses beyond the ninth grade. Thus, the middle school years are important both for raising scientific awareness and for aiding students in their career planning. By exposing children to short science courses which are of interest to them, it may be possible to encourage scientific or technological careers.

History of the Project

Researchers have found the social aspect of "doing things together" to be a prime factor motivating visits by family groups to informal science centers. One of the predominant themes emerging from their observations is the visitors' need for interaction with other members of their family.

To see if families composed of parents and their middle school children could have a valuable learning experience taking formal science courses together in an informal science center, a pilot study was conducted during the Winter of 1979. Twenty-five people (13 parents and 12 children) participated in a course on animal behavior taught at the Minnesota Zoological Garden

(MZG). The course met for three hours on five consecutive Saturday mornings in a MZG classroom, where discussions, film viewing, observations,demonstrations and inquiry activities took place. The zoo exhibits were used for observing particular animals. The presentation of topics and concepts was geared for the middle school aged children. An inquiry model of teaching was used, both in order to reflect the nature of science and to model questioning techniques for the adults. In addition, the participants were given a male and female gerbil in a cage to take home and observe during the five weeks of the course. The purpose of the home activities was two-fold: to provide animals which would exemplify certain behaviors discussed and observed in class, and to provide activities for the parents and children to do together.

The results of pre and post cognitive tests indicated that informal courses which provide science learning experiences for both parents and their children may be an effective and rewarding method of increasing scientific awareness in our society. The five courses described in this manual were developed during the Fall of 1980, with the support of the National Science Foundation (Grant #07872), to test the effectiveness of parent/child learning in additional content areas. The courses have been taught over 35 times mainly in the St. Paul-Minneapolis area, but also in Seattle, washington, Athens, Georgia, and Milwaukee, Wisconsin.

Rationale for Selecting Courses

In an effort to determine which science courses parents might be interested in taking with their middle school children, a questionnaire listing possible courses was sent out to parents of middle school aged children in Minneapolis and in Mounds View, a suburb of St. Paul. Nighttime astronomy, animal behavior, microcomputers, and ecology/nature study received

high ratings. A fifth course, Communications Technology: Telegraphs, Telephones, and Radios, was added to attract children interested in technology.

Synopses of the Courses

Animal Behavior. Participants study zoo and laboratory animals' responses to various environmental pressures. They explore territoriality, aggression and other social interactions using the materials and skills one needs to observe and care for animals in the laboratory, in the field, and at home. A pair of male and female gerbils are provided for home study. The home activities are meant to extend the learning that takes place in the classroom and to sharpen participants' skills in observing the behavior of animals.

Building Telegraphs, Telephones, and Radios. Participants are introduces to circuitry and the principles of modern communications systems, including those associated with telegraphs, telephones, and radios. The course includes experimenting with circuits, electromagnetism, and the use of the oscilloscope, as well as building simple telegraphs, microphones, crystal radios, and audio amplifiers. Activities and experiences are designed for people without any electronics background. Home activities involved the completion of projects started in class.

Microcomputers. This course introduces participants to microcomputers by using some of the popular personal computers on the market today. Participants learn how to program computers and explore some recreational and practical computer applications, thereby better understanding how computers are presently being used in society. Activities and experiences in the class are designed for people without computer background. Home activities mainly involve introducing and improving programming skills.

Nighttime Astronomy. Participants are shown how to observe everyday

celestial events in the night sky. They take advantage of the permanently "clear skies" of a planetarium and perform a series of astronomy-related activities including the building of an astrolabe. The course, which is meant to give participants a wider appreciation of the universe, includes a trip to a local observatory. Home activities involve observations of the natural sky and measurement of celestial phenomena.

Winter Nature Study. Participants are introduced to the study of ecological principles and the phenology at a nature center during the winter. Participants track animals, band birds, and study muskrat houses. They also build snow shelters, preserve snowflakes, and study water and mud taken from under the ice of a frozen lake. Observations of pond water and bird watching are two of several home activities for this course.

Results of Field Testing

During the first year, each of the five courses was taught twice, one in winter and once in spring (except for the winter ecology course) to a total of over 200 participants. The following results are based on an attitude questionnaire administered to participants at the end of the winter courses.

On a scale from "Not Very Enjoyable" (1) to "Very Enjoyable" (5), the parents and children rated the courses highly (4.62). When asked if they would recommend the course to a friend, 99% of the participants said "yes". Ninety-seven percent of the participants said they liked taking the course with their respective parents or children. Responding further to the question "Why?", almost half (48%) of the participants gave responses which could be categorized as the opportunity to work and learn together. Most of the participants (91%) said that they would like to take similar courses offered on different topics. Commenting on the most rewarding experience resulting

from the course, parents gave responses which could be classed as sharing experiences with their child(ren). Most of the children tended to give content-oriented responses to this question (e.g., using a computer, locating and identifying constellations, etc.).

For the spring courses, some of the same open-ended questions were asked. There was a consistent pattern of responses to these questions for both the winter and spring participants in all five courses. The aspects of the courses that parents and children liked best were the instructors, the organization and presentation of the content, and home activities. In addition, participants listed specific activities, such as bird banding, building an audio amplifier, and the computer games. The answers to the question of how the courses might be improved reflected the positive attitudes of the participants (e.g., participants would have liked more classes, or additional content). When asked, "What did you find out about your child/parent that you did not know before taking this course?", children most often mentioned that they learned that their parents were interested in and enjoyed the course content; parents most frequently responded that they gained insight into their children's learning behaviors.

The responses of the winter participants to some of the open-ended questions were analyzed and written as a set of 35 statements. The spring participants could agree or disagree with these statements on a five-point Likert scale. The results revealed a consistent pattern of responses among the five courses and indicated that attitudes toward the courses were approximately the same for the winter and spring participants. Children most strongly agreed with statements pertaining to the informal class atmosphere, enjoyment and interest in learning about the content presented in he courses, and the quality of instruction. Parents reacted positively toward the

informal atmosphere, the class activities, the opportunity to learn and spend time together as a family, and the instruction.

In addition to the attitude measures, a 25 to 30 item cognitive test was designed for each course and administered as a pre- and post-test. Both the winter and spring participants in all five courses made significant gains in learning the subject matter of the courses ($p<0.05$). For almost all courses, each time they were offered, parents and children made significant cognitive gains.

ADMINISTRATIVE ORGANIZATION

Teaching Sites

Ideal sites for parent/child courses are informal science learning centers (e.g., a zoo, planetarium, nature center, or science museum) or a classroom for the microcomputer course. Of prime consideration when choosing a site for a course is whether the site has access to materials and facilities that are necessary to teach the course effectively.

Animal Behavior : A zoo is the best place to teach this course because of its ready access to animals. A nature center could be used, however, if animals found in the local environment were studied. With major modifications, the course could be taught in a school classroom. This would necessitate a change in emphasis from the study of mammals and birds to the study of lower vertebrates and invetebrates.

Building Telegraphs, Telephones and Radios : A classroom in a science museum is the ideal site for this course. Other sites have, however, been used successfully. On one occasion the course was taught in a university classroom. A high school physics classroom could also be used.

Microcomputers : A science museum which has access to a microcomputer for each family could be used to teach this course. Other sites have,

however, been used successfully. On several occasions the course was taught in school classrooms equipped with fifteen microcomputers and on one occasion in a large room in the administrative building of a school district.

Night-time Astronomy : A school or museum planetarium is the idea site for this course. If constellation slides and films were used in place of the artificial sky of the planetarium, night-time astronomy could be taught in a school classroom. This would, however, necessitate a major modification of the course as presented in this project.

Winter Nature Study : A nature center is the ideal site for this course. Any natural area with the availability of shelter in case it's needed, however, would be suitable for teaching this course.

Personnel

The instructors of the parent/child courses should be effective teachers and be knowledgeable about the subject being taught. All of the individuals who taught the courses in Minnesota were licensed teachers.

Animal Behavior. The animal behavior instructor could be one of the educational personnel at the local zoo or a biology teacher who has taken coursework in ethology and who feels at ease teaching concepts associated with animal behavior.

Building Telegraphs, Telephones, and Radios. The communications technology instructor should be knowledgeable in physics and/or engineering, have a bent toward the practical applications of physics, and enjoy building apparatus or equipment. If the instructor does not have a physics background, s(he) will need to study the theoretical background of communications technology. A physics teacher who is also a "tinkerer" could be effective if s(he) remembers the age of the young participants. A junior high physical science teacher would be good if s(he) has a sufficient physics background.

Microcomputers. The instructor for the microcomputer course should be familiar with the use and operation of microcomputers, their importance in society as well as having a knowledge of the BASIC computer language.

Night-time Astronomy. The night-time astronomy course is best taught by someone who has a good understanding of astronomical phenomena. Personnel at a planetarium are ideal; but teachers who are particularly interested in astronomy would make good night-time astronomy instructors.

Winter Nature Study. This course should be taught by someone who has a biology background, either pure or applied (e.g., fisheries, wildlife, forestry), and enjoys interpreting nature to others. A naturalist at a nature center or a biology teacher who is "at home" out of doors are possibilities.

Scheduling

Saturday morning from 9:00 a.m. to 12:00 noon was selected as the course meeting time. A night-time period was used for the astronomy course since the instructors sometimes used the natural sky for viewing (Tuesday night from 7 p.m. to 9 p.m. was selected in trial testing). The sessions for this course were only two hours long to avoid interfering with the dinner hour or bed times of the children. Only the content of the winter nature study course is dependent upon the season during which it is taught.

Participants

The maximum number of families per course that can be handled reasonably well is twelve. Most families sign up in twos (that is one parent and one child). If courses were to enroll a large number of families in family groupings of more than two, the number of participants could become unmanageable. We have found that enrollments between 24-32 are reasonable. It is valuable to set a limiting number of participants. As families register, keep a running total of the number of participants. It would be

wise to have alternative families sign up after the limiting number has been reached, so that these families can replace those who might decide at a later time that they cannot participate in the course.

We have found that various family groups register for the courses. More 6th and 7th graders than 8th graders have registered for these courses. The adults attending such courses with their children are generally professional workers or the spouses of professional workers. Parents take these courses primarily because their children are interested in the subject matter of the courses. However, even professionals in the specialized areas of the subject enjoy taking the course with their children. The following excerpt is taken from a letter sent by Dr. Richard Phillips, a Professor in Animal Science at the University of Minnesota. He is a specialist in animal behavior who enrolled with his family in the Animal Behavior course:

> "My own reaction was entirely favorable. Although as a professional animal behaviorist, I was undoubtedly an atypical parent as far as jointly learning about animal behavior with my children, the opportunity to see such a wide array of animals in such remarkably successful demonstrations was a wonderful opportunity for us to see and do things together."

Publicity

In attempting to recruit families for courses, we found it particularly valuable to work with the Director of Community Education, and the Science and Mathematics Consultants from the school districts involved. With their assistance, brochures announcing the courses and registration procedures were developed and sent out to potential participants. (See Appendix A for an example of the four page flyer used to notify Minneapolis parents of the parent/child courses.) They also assisted in contacting middle school and

junior high school science teachers who in turn handed out the brochures to the children to give to their parents.

If these courses will be offered through informal science learning centers (e.g., zoos, museums, etc.), the newsletters that are sent out to members can be used to announce the courses. This was done with the assistance of personnel of the planetarium, museum, zoo and nature center with whom we worked. This method was the most successful of all the publicizing methods that we used. (See Appendix B for examples of notices taken from newsletters sent out by the Science Museum of Minnesota and from the Minnesota Zoological Gardens.)

Cost

It is difficult to give exact figures for the cost of each course. There are two sets of materials needed; (1) materials for the activities done in class, and (2) materials for projects the families take home to keep (e.g., astrolabe, bird feeder, crystal radio set, etc.). The cost for each course will, therefore, depend on how many materials for the in-class activities are available at the teaching sites, and on where the materials are bought (supply houses, surplus stores, etc.).

The approximate cost per family for the take-home materials for each course is listed below.

Animal Behavior	$10.00
Building Telegraphs, Telephones, and Radios	$25.00
Microcomputers	$10.00
Night-time Astronomy	$14.00
Winter Nature Study	$10.00

The Teachers' Guides

The teachers' guide for each course contains several chapters. The introduction provides the teacher with a rationale for teaching the course to parents and their children, a list of supplies and materials for the course, and suggestions for ordering materials and for advance preparation of materials. Each of the remaining chapters describes one of the five sessions of the course. Major headings within a chapter are "Overview" or "Synopsis," "Materials," "Advance Preparation," and "Teaching Suggestions." Also included in the teachers' guide are worksheets or activity sheets and other handouts (ready for duplication) for class and home activities.

Overview. Under this heading the activities of each class session are summarized.

Materials. This section lists materials needed for the activities in which the class members participate as well as class demonstrations.

Advance Preparation. Under this heading the teacher will find a complete description of how to prepare for each session.

Teaching Suggestions. Under this heading the teacher will find all the activities intended for use by the whole class. Most of the activities are carried out by family groups, although discussions and demonstrations are also listed as activities. A purpose or learning objective is included for each activity, along with a suggested time for the completion of the activity.

Most of the teaching strategies are directed toward the middle school aged participants. Wherever possible, a sensory, hands-on approach is used for teaching concepts of the courses (e.g., actual work on the computer, animals to see and to touch, building telegraphs and telephones, looking at the stars, building an astrolabe). Also, most of the observations, exploration of

materials, and/or collection of data takes place before any extensive discussion of the topic. We feel that this strategy of exploration before introducing terminology and concepts is particularly effective for the young participants.

Discussions and demonstrations have an inquiry flavor (e.g., What did you find out? On the basis of what you have seen, which is the most effective means for getting the Siamese fighting fish to display? What did you find out makes the electromagnet stronger?). We feel it is valuable for children to see parents ask questions of instructors; however, sometimes parents ask questions which are somewhat technical. We suggest that if it appears the answer will be beyond the understanding of the middle school aged participants, then the question should be answered as briefly as is tactful, and then move on at the appropriate level.

Planning Considerations

Contacting Participants Before Course Begins. If recruitment is done by other agencies or personnel, it will be necessary to notify the participants that they have been accepted for the course and to inform them of any last minute details that will make their attendance at the first meeting a success (e.g., directions to site, parking, etc.). Phone calls to participants are time-consuming; letters seem to work well. Notification by letter is particularly helpful if directions to the site need to be provided. (See Appendix C for a sample letter.)

Getting Started. The first session of the course is a particularly important one for establishing the parent/child nature of the course. We usually allow about fifteen minutes for participants to arrive for the first day of class since some participants may have difficulty finding the site.

Blank name tags should be made available for participants. During this time, it would be useful for the instructor to move informally from family to family in order to become acquainted with them. When class begins, the instructor should take the time to introduce him(her)self and explain the nature of the course. After that, ask the class to introduce their family members to the whole group (parents introduce their children and vice versa), and to tell one important or characteristics fact about them. After the introductions, the class can begin.

Treats. We have found that providing a fifteen minute break with coffee, cocoa and cookies/bars midway through each session of the course is a feature that most participants enjoy. Participant families took turns bringing snacks, cups, and various drinks. The break gives participants a chance to get to know one another better, go to restrooms, and provides an opportunity or participants to talk to the instructor about specific problems or ideas that the participants have.

Home Activities. The home activities for the courses are designed to increase the participants' knowledge of the subject matter as well as the time parents and children spend together. To encourage the participants to do the home activities, the instructors should spend a few minutes at the end of each class session in order to introduce and discuss the home activities for the week. At the beginning of the following session, the instructors should spend some time discussing the outcomes of the home activities and projects.

Final Certificate. At the conclusion of the course, certificates were given out to the parents and children. This appeared to be an appropriate and well-accepted culminating gesture. The certificates, (with a gold seal and ribbons attached) were given out on the last day of class. An example of one is included in Appendix D.

EVALUATION PROCEDURES

Keeping Attendance

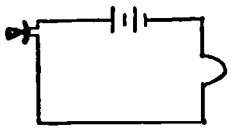
In order to determine whether the courses are effective in promoting cognitive growth and positive affective outcomes, it is necessary to know whether participants have been exposed to the entire course. It is, therefore, necessary that attendance of participants be kept. This can be accomplished by having sign-in sheets and making sure that everyone has signed in by the end of the class session.

Instructors need to be alerted to the fact that a commitment of five Saturdays, without missing a session, may be unrealistic for some families. Even so, attendance was remarkably good in the courses taught in Minnesota. It was noted that sometimes when a father might not be able to attend, the mother would attend in his place, and vice versa. The material in the courses, although logically sequenced, is such that it is possible to understand the material during a particular session if individuals miss the previous week's work. The one exception to this might be the microcomputer course; however, even here, with extra time spent reviewing the previous week's work, it is possible to pick up missed information.

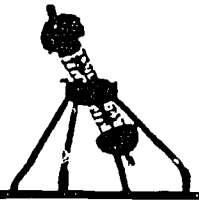
APPENDIX

OUT-OF-SCHOOL SCIENCE LEARNING EXPERIENCES FOR SIXTH, SEVENTH, AND EIGHT GRADE STUDENTS AND THEIR PARENTS

SPRING 1981





SCIENCE LEARNING EXPERIENCES FOR YOU & YOUR CHILDREN

THE UNIVERSITY OF MINNESOTA UNDER THE AUSPICES OF THE NATIONAL SCIENCE FOUNDATION AND THE MINNEAPOLIS SCHOOL DISTRICT WILL BE OFFERING A NUMBER OF COURSES FOR PARENTS AND THEIR CHILDREN WHO ARE PRESENTLY ENROLLED IN THE MINNEAPOLIS DISTRICT IN GRADES SIX, SEVEN OR EIGHT. THESE COURSES WILL SUPPLEMENT THE SCIENCE TAUGHT IN MINNEAPOLIS SCHOOLS. ONE OR BOTH PARENTS MAY PARTICIPATE WITH THEIR MIDDLE SCHOOL CHILDREN.

THE COURSE WILL BE OFFERED AT SEVERAL SCIENCE LEARNING SITES, INCLUDING THE MINNESOTA ZOOLOGICAL GARDEN, UNIVERSITY OF MINNESOTA, WOOD LAKE NATURE CENTER AND THE MINNEAPOLIS PLANETARIUM. WE FEEL THIS WILL BE A GREAT FAMILY LEARNING EXPERIENCE. THESE COURSES WILL BE OFFERED FREE OF CHARGE WITH A LIMIT OF ONE CLASS PER FAMILY.

WE ALSO FEEL THAT THESE COURSES WILL FUNCTION AS EXPERIMENTAL MODELS FOCUSING ON PARENTS AND CHILDREN LEARNING TOGETHER. THEY ARE ESPECIALLY ATTRACTIVE BECAUSE THE CONTENT OF THE COURSES WILL BE PRESENTED ON A LEVEL THAT BOTH THE MIDDLE SCHOOL CHILDREN AND THEIR PARENTS CAN APPRECIATE. THE ACTIVITIES ARE INTENDED TO INCREASE YOUR SCIENTIFIC KNOWLEDGE AND THE TIME YOU SPEND TOGETHER.

REGISTRATION INFORMATION: 376-3346

PLEASE FILL OUT THE REGISTRATION FORM, STATING A FIRST, SECOND AND THIRD CHOICE OF CLASSES. REGISTRATION WILL BE LIMITED TO ONE CLASS PER FAMILY. NO TELEPHONE REGISTRATIONS WILL BE ACCEPTED. ALL CLASSES WILL BE FILLED ON A FIRST-COME, FIRST SERVED BASIS. THERE WILL BE CONFIRMATION AND DIRECTIONS SENT IF YOU HAVE BEEN ACCEPTED.

DEADLINE TO REGISTER WILL BE -- TUESDAY, MARCH 17, 1981.

SCIENCE LEARNING EXPERIENCES ---- REGISTRATION FORM

NAME _____ PHONE _____ (HR)

ADDRESS _____ _____ (WK)

TITLE OF CLASS _____ (FIRST CHOICE)

_____ (SECOND CHOICE)

_____ (THIRD CHOICE)

STUDENTS NAME: _____ SCHOOL _____ GRADE ____

NUMBER OF PERSONS THAT WILL BE ATTENDING: _____

MAIL REGISTRATION TO: Dr. Eugene Gennaro
Out-of-School Science
370 Peik Hall
159 Pillsbury Dr. S.E.
Minneapolis, MN 55455

NIGHT-TIME ASTRONOMY - Dennis Brinkman, Director Cone Planetarium and Rod Nordahl, Minneapolis Planetarium Program Assistant
Participants will be shown how to observe everyday celestial events in the night sky and the permanently "clear skies" of a planetarium. They will perform a series of experiments and activities including a trip to a local observatory that will enable them to appreciate the universe and their vantage point in it. Maximum number - 8 families. 5 weeks.
Tuesdays - March 24 - April 21 7:00-9:00 PM
Planetarium, Minneapolis Library, 300 Nicollet Mall, Minneapolis, MN

ANIMAL BEHAVIOR - Cathy Lundgren, Public Education Manager: Minnesota Zoological Garden
Participants will investigate the behavior of zoo and laboratory animals. The course will include a study of animal responses to various environmental pressures, social interaction and the materials and observational skills one needs to study and care for animals in the laboratory, in the field, and at home. Small animals will be provided for home study. Maximum number - 8 families. 5 weeks.
Saturdays - April 4, 11, 25 9:00 AM-12-Noon See Bus Information Below
May 2, 9

COMMUNICATIONS TECHNOLOGY - Patricia Heller, Science Educator: University of Minnesota
Participants will be introduced to the principle of modern communications systems. The course will include electromagnetic experiments and making simple telegraphs, telephones, and radios. Activities and experiences in the class are designed for people without any electronics background.
Maximum number - 8 families, 5 weeks.
Saturdays - April 4, 11, 25 9:00 AM-12-Noon See Bus Information Below
May 2, 9

SPRING ECOLOGY - Ann Sigford, Naturalist: Wood Lake Nature Center
An outdoor course for participants who want to study nature in the Spring. Wood Lake's ecosystem will be explored from its tiny organisms to its territorial birds. Participants will take a field trip to hunt fossils and will finish the course with a wild foods lunch which we will make ourselves. Maximum Number - 30 families. 5 weeks. Saturdays - April 4, 11, 25; May 2 8:45 AM-12:15 PM See Bus Information Below

BUS TRANSPORTATION: Pick-up points will be Edison High School, Central High School and Washburn High School. Bus information will be provided to participants.

BIOGRAPHICAL SKETCH OF THE INSTRUCTORS

KATHY LUNDGREN (Animal Behavior)
Kathy Lundgren received her B.S. and M.A. at the University of Minnesota. She was a biology and earth science teacher in secondary schools. She has worked with volunteers at both the Minnesota Zoological Gardens and the Science Museum of Minnesota. She was a script writer and program developer at the museum and was a master teacher in the Twin City Institute for Talented Youth at the Zoo.

ANN SIGFORD (Spring Ecology)
Ann Sigford has been an interpretive naturalist for Wood Lake Nature Center (Richfield, MN) since 1973. In this time she has worked with all ages of people in the out-of-doors. Her degree is in wildlife management so she has a background in botany, ornithology, museology and other natural sciences. She is the author of two middle-school level science books: Tallgrass and Trouble, about the prairie, and Eighty Words of Thirsty, about water problems in the desert.

PATRICIA HELLER (Communications Technology)
Patricia Heller received her B.S. and M.S. in physics at the University of Washington and her Ph.D. in Science Education at the University of Michigan, where she won an award for the best doctoral dissertation of the year in school wide competition. She has taught high school physics, elementary and middle school science and is presently a lecturer at the University of Minnesota in Science Education.

DENNIS BRINKMAN (Night-time Astronomy)
Mr. Brinkman received a B.S. degree in chemistry from Mankato State College in 1968. He has had experience teaching all sciences in schools located in Iowa, Minnesota, and Australia. Dennis is currently in his third year of Directorship at the Cone Planetarium. He is enrolled in a Masters Program at the University of Minnesota and is an active member of the Great Lakes Planetarium Association, the Wisconsin, Iowa, Minnesota Planetariums, and the International Planetarium Society.

ROD NORDAHL (Night-time Astronomy)
Mr. Nordahl received his B.S. degree in secondary science education from the University of Minnesota in 1974, and has taught junior high. For the past 5½ years, he has been employed as the program assistant at the planetarium in downtown Minneapolis where he is an active member of the Wisconsin, Iowa, Minnesota Planetariums, Great Lakes Planetarium Society.

FOR INFORMATION ON ANY OF THESE PROGRAMS PLEASE CALL:
Dr. Gene Gennaro, Project Director Science Education,
University of Minnesota --373-3305 or 376-3348; 370 Peik Hall 159, Pillsbury Drive, S.E.; Minneapolis, MN 55455

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ICOUNTERS
ıe Science Museum of Minnesota
ıl. 4, No. 3
ırch 1981

-Classes for Kids-

NIGHTTIME ASTRONOMY: A CLASS FOR PARENTS AND KIDS

Tue, Mar 24 - Apr 21, 7:00 - 9:00 p.m.

This course is co-sponsored by the University of Minnesota under the auspices of the National Science Foundation and is offered to 6th, 7th, and 8th grade students and their parents. Participants will be shown how to observe everyday celestial events in the night sky and will be able to take advantage of the permanently "clear skies" of a planetarium. A series of experiments will be performed and activities will include a trip to a local observatory. Because of NSF funding, this course is offered free of charge to six SMM member families whose children are in the 6th, 7th and 8th grades. Please indicate the names of your family members who will be participating. Pre-registration required.

Location: Children's Center and Planetarium, Mpls.
Instructors: Rod Nerdahl, Planetarium program assistant, and Dennis Brinkman, Director of Como Planetarium
Fee: Free to SMM Members

THE TECHNOLOGY OF COMMUNICATIONS: A CLASS FOR PARENTS AND KIDS

Sat, Apr 11 - May 9, 8:00 a.m. - noon

This course is co-sponsored by the University of Minnesota under the auspices of the National Science Foundation and is offered to 6th, 7th, and 8th grade students and their parents. Participants will be introduced to the principles of modern communications systems, including telegraphs, telephones, radios, phonographs, television, and use of lasers. This course will include electromagnetism experiments and making simple telegraphs. The class is designed for people without any electronics background. Because of NSF funding, this course is offered free of charge to six SMM member families whose children are in the 6th, 7th or 8th grades. Please indicate the names of your family members who will be participating. Pre-registration is required.

Location: U of M, 385 Peik Hall
Instructor: Patricia Heller, Science Education Department, U of Mn
Fee: Free to SMM Members

ZOO NEWS
Minnesota Zoological Society
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Families, Families, Families
Adventures in Shared Learning

The Minnesota Zoological Garden, in conjunction with the University of Minnesota, is a part of an exciting new program funded by a National Science Foundation grant. For five Saturday mornings in April and May, parents and their 6th, 7th and 8th grade children will have the opportunity to learn together at the Zoo. Laboratory activities, interaction with live animals, and home projects will all be a part of every session conducted by Zoo staff. This pilot program is offered free to all participants. For more information or to reserve a place in the class please call 222-1706.

Parent/Child Science Experiences

College of Education · 370 Peik Hall · 159 Pillsbury Drive S.E. · Minneapolis, Minnesota 55455

Dr. Eugene D Gennaro, Project Director
Dr. Patricia Heller, Associate Director
(612) 373-3305 or 376-3346

April 3, 1981

This is to confirm your registration in the Communications Technology course, Saturdays 9:00 AM to 12:00 PM, April 11 through May 9, at 385 Peik Hall, University of Minnesota. A map is enclosed indicating parking areas and the location of Peik Hall.

This course is an experimental model focusing on parents and their middle-school children learning together. Doing home activities together for about one hour each week is an integral part of this experimental model, and the class activities are designed to build on the home activities.

In this course, we will build telegraph sets, microphones, crystal radio sets, and an audio amplifier. It would be very helpful if you could bring to class the materials listed below on the dates indicated.

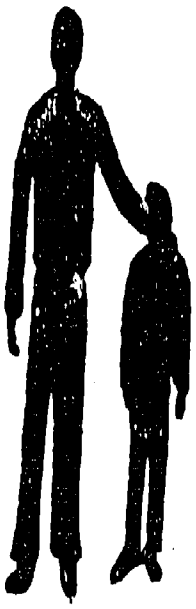
April 18: hammer, screw drivers
April 25: screw driver
May 2: cardboard tube from paper towel, aluminum foil or plastic wrap roll
cardboard box about 12" X 16"
plastic wrap, aluminum foil
hammer, screw driver
May 9: screw driver

I'm looking forward to seeing you on Saturday, April 11.

Sincerely,

Patricia Heller

Shared Learning Experience in Science



This is to certify that

_____

has completed

_____

at the _____

Signed: _____

Date: _____

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