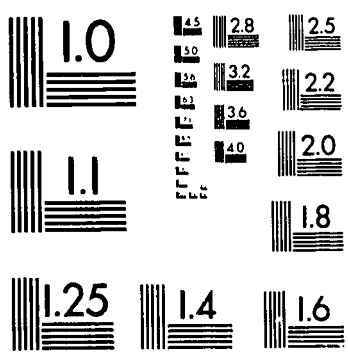

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ABSTRACT

Reported are three studies of attitudes towards and effects of science education field trips. In the first study, 425 fifth and sixth graders participated in outdoor science activities in one of three types of settings. Results indicated that more learning took place when the number of available examples of concepts to be learned and setting novelty were both maximized. Students reported positive feelings about their experience and were observed to be spending over 90% of their time during the field trip on the assigned activities. The second study surveyed the attitudes and perceptions toward field trips of a nationwide sample of teachers, administrators, college methods instructors, and nature center professionals. All four groups held positive attitudes toward field trips and provided similar responses to most questionnaire items. The final investigation demonstrated the significant influence of certain factors associated with field trips upon learning and behavior. The three studies indicate that educators view science field trips as important, that field trips have clear cognitive and affective benefits, and that certain characteristics of learners and the field trip setting influence student attitudes, behavior, and learning. (Author/WB)

Final Report

July 16, 1979

Setting a Neglected Variable in Science Education: Investigations into Outdoor Field Trips

SED 77-18913

Principal Investigator:

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Dr. John D. Balling

Project Summary

Field trips to non-formal educational settings, such as museums, zoos, or nature centers, are a significant, but poorly understood, aspect of elementary science education in America. This project sought to determine how certain aspects of the site selected for a field trip influence student behavior, affect, and learning. A second goal was to discover what current educational practitioners think about field trips, and to relate their attitudes to observations of actual field trips.

The first study examined the effects on field trip behavior and learning of: a) the relative novelty of the setting for the trip, and b) the number of relevant examples of the concepts to be learned available at the site. Four hundred twenty-five fifth and sixth-grade subjects from urban, suburban, or rural schools were taken to one of three locations -- a small park on a busy street in a large city, a park in a quiet residential neighborhood, or a forest -- to do an outdoor science activity. In general, learning proved to be best in situations where the number of relevant examples and setting novelty were simultaneously maximized. Affective data showed that the participants were very positive about this field experience and generally thought they had learned a good deal from it. Observations made during the study revealed that most students spent over 90% of their time during the field trips involved in the activity.

Study two was a survey of a representative nation-wide sample of elementary school teachers, elementary school administrators, college science education methods instructors, and nature center professionals. The study assessed their attitudes and perceptions toward field trip experiences. All four groups held positive attitudes toward field trips and were remarkably similar in their responses.

The consensus opinion was that the major benefits of field trips are, in decreasing order of importance: a) the development of more positive attitudes toward science among the students, b) the learning of certain science facts, concepts, and related skills, and c) the improvement of the social climate in the class.

The final investigation dealt with the field-trip milieu in order to determine how the constellation of environmental factors surrounding the usual field trip (e.g., a day away from school, disruption of normal schedules, and bus rides) interact with learning and behavior. In this study, 98 third-grade and 98 fifth-grade subjects were divided into groups that either did an outdoor science activity in an area outside their schools or at a nature center they had not visited previously. Viewing the milieu factors from a novelty/familiarity perspective, significant developmental differences emerged. Third graders showed much greater learning when the milieu was familiar and minimally disruptive to their normal school day, while fifth grade students thrived on the excitement of a full-fledged field trip away from school. Both groups showed significant retention of the subject matter of the field activity one month later. Behavioral observations also revealed that the third grade students displayed less off-task behavior in the setting outside their school as compared to the nature center while the reverse was true for the fifth graders.

Taken as a whole, these three studies indicate that field trips are a valuable part of the science education of elementary school children. Field trips have clear cognitive and affective benefits. The experimental portions of this project also revealed that the characteristics of the setting for a field trip and certain aspects of the relationships of the participants with this setting can have a significant influence on student attitudes, behavior, and learning.

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The Effects of Environmental Novelty and Relevance on Field Trip Learning and Behavior

The purpose of this study was to investigate the combined effects of two environmental variables--setting novelty and setting relevance--on student behavior and learning during a science field trip. The relative novelty of the setting and its relevance to the subject matter to be learned are often used to influence behavior and learning. A number of laboratory studies (e.g. Lubow, Rifkin, & Alck, 1976; Melzack & Burns, 1965), as well as field investigations (Falk, Martin & Balling, 1978; Martin, Falk & Balling, Note 1), have shown that the relative novelty of the physical environment for a learning task can have significant effects on children's overt behavior and cognitive learning. For example, as Martin, Falk & Balling (Note 1) have shown, doing a biological science activity in a forested setting, rather than the community schoolyard, may actually hinder learning for students who are very unfamiliar with natural environments. However, a forested setting for the activity tends to facilitate learning of biological concepts for children who are only slightly more experienced with forests.

Although rarely investigated, the relevance of the setting for learning the subject matter presented to the student is also an important variable to consider, especially since the reason many educators give for conducting outdoor based learning activities is that relatively more concrete examples of natural phenomena can be discovered outside, rather than inside, the classroom (cf. Falk & Balling, Note 2). A paraphrase of the hypothesis on which a good deal of current science education operates states that the more direct experience students have with a given phenomenon (e.g. trees, spiders, estuaries) the better will be their understanding of that phenomenon. Recent theorizing by Anzai and Simon (1979) also supports the notion that the knowledge of results available through hands-on experience with real world objects may be the critical factor in learning by doing. However, within the class of settings in which some exposure to relevant examples is possible, what makes one setting more educationally desirable than another for a particular field activity? As a first approximation of an answer to this question, it was hypothesized that learning, and possibly other student behaviors, were a function of the number of relevant examples available to the student in the field trip setting.

In most naturalistic situations, however, environmental complexity will tend to increase directly with the number of relevant examples in a given area. With more examples crowded into an area, the visual array becomes more complex and the number of possible relationships among objects increases rapidly. These factors alone make it more difficult for an individual, particularly a novice, to perform a perceptual analysis of the situation. Further, Berlyne (1960, 1966) has shown that both stimulus complexity and novelty operate to influence arousal and performance on a variety of tasks. In general, under very high or very low levels of arousal, performance on complex learning tasks tends to suffer. Based upon Berlyne's theory, it was hypothesized that the number of relevant examples available in a setting for a field trip and familiarity with that setting should interact. Although a certain minimum number of examples must be present for learning to occur, students should perform best in settings that are moderately unfamiliar to them. On the other hand, the relationship of number of relevant examples to complexity may work to place an upper bound on the number of examples that are useful to the learners. This upper bound should be different depending upon the past experience or familiarity of the students. People with relatively less experience with the examples present in the various settings should require somewhat less complex environments for optimal learning.

In the present study, the variables of environmental novelty and relevance were investigated within the context of an outdoor field trip designed to teach some basic biological concepts to upper elementary school children. Specifically, the lesson was concerned with intra- and inter-specific variation. Trees were used as an example of a biological phenomenon exhibiting both of these characteristics. Trees are also an obvious stable, and important, aspect of most natural environments. Settings that differ in both the number and diversity of trees are relatively easy to find. Thus, several settings that differed in terms of the number and kinds of trees present were chosen as sites for the field trips. The relative novelty of the environment for the students was varied by selecting children, who by virtue of their place of residence, possessed differential knowledge of trees and natural environments.

Method

Subjects. Subjects for this study were 425 fifth and sixth grade students from four different public schools located in three different types of communities--urban, suburban, and rural. All schools were part of the same large school district. One hundred and thirty students (76 females, 54 males) in 5 classrooms came from the urban school; 110 subjects (53 females, 57 males) in 4 classrooms came from the suburban school; and 185 students (75 females, 107 males, 3 unrecorded) in 6 classrooms came from two different rural schools. The students in all classrooms were predominantly white (>90%). The schools from which the subjects were taken were all located in middle to lower-middle socioeconomic class areas, as based upon current census tract data collected by the regional Office of Planning and Zoning.

Design. Manipulation of the major variables in this study--number of examples, familiarity and sex--resulted in a 3X3X2 completely randomized factorial design. Three areas which differed in the number and diversity of trees were selected as sites for the field activities. All were approximately 3/4 acre in size. The site with the fewest number of trees and least species diversity was a small urban park on a busy street corner. An intermediate level of tree density and diversity was found in another small park in a suburban residential area. Finally, the site with the greatest tree number and diversity was a relatively undisturbed forested area within a very large, diverse park. All areas were located within a major metropolitan area in the Eastern United States. None of the subjects had previously visited any of these specific locations. The only man-made objects in any of the sites was a single bench in the urban street park.

Three levels of general familiarity with the kinds of settings used in the study were obtained by drawing subjects from urban, suburban, and rural areas.

Previous research (Falk, Martin & Balling, 1978) has suggested that place of residence is highly correlated with familiarity with forested settings. For the purposes of the present study, it was assumed that place of residence is also related to familiarity with urban and suburban environments.

Several weeks preceding the field activity, all subjects were given a pre-test which covered attitudes and knowledge of the concepts involved. The experimental task was done in the context of an all day field trip away from school taken in the spring of the year. Prior to the trip, each classroom teacher was asked to divide the students into thirds with roughly equal proportions of boys and girls and ability levels represented in each group. On the day of the trip, the entire class was bussed to the general area of the three sites--a trip of approximately one hour. Each third of the class was then dropped off at one of the experimental sites. Following the activity, which lasted 45 min. to 1 hr., the subjects were given a post-test. The bus then picked them up and they were returned to their school. Behavioral observations were also made during the activity.

Three different teachers, all female college students, were especially trained for the experimental task, and they were rotated such that they all led the activity an equal number of times in each location.

Activity and Dependent Measures. The activity used in this study was designed to help students learn the basic ideas of inter- and intra-specific variation, particularly with regard to trees. After making a series of systematic observations of a number and variety of trees, it was hoped that the students would discover the underlying concepts which can be used to describe the naturally occurring differences among and within species. Preliminary data had shown that although many upper elementary students had some rough ideas about inter- and intra-specific differences, their notions were poorly understood and not well articulated.

The activity, which was developed specifically for this study, required students to work in pairs to gather data from the trees in the specified area. After a brief introduction to the purposes of the activity, pairs of subjects were given packets with data sheets and the materials they would need for gathering information. Students were told to obtain information from as many trees as possible. Subjects collected a leaf from each tree they visited, measured the circumference of the trunk, determined bark texture, and matched the bark color to a color chart. After gathering data for approximately 15 minutes, the students were called together for a brief discussion of what they were finding. Subjects then dispersed for another 15 minutes to collect more information. To end the activity, subjects were called together to compare and categorize their data sheets.

The cognitive items on the pre- and post-tests used to measure learning due to the experimental activity were identical. Questions asked students to tell what they would look at to discriminate among trees, to judge how likely it would be that differences along a given dimension (e.g. leaf size) indicate inter- or intra-specific variation, to label differences as inter-specific or intra-specific, and to generalize the concepts of inter- and intra-specific variation to organisms other than trees. The format of the test was fill-in and multiple choice.

Attitudinal items were also asked on both the pre- and post-tests. Pre-test items probed where the students thought it would be best to learn about trees. Post-test items asked whether the students liked the activity and the place where they did it, whether they thought they would remember the activity and the place, and whether they thought they had learned anything from the activity.

Behavioral observations were made of each pair of students who participated in the study. Using a time-sampling technique, an observer followed a pair of students for 6 minutes and recorded the behavior of both members of the pair every 30 seconds. After 6 minutes with one pair, observations began on another until all pairs had been observed once. The observer then began again with the first pair and repeated the cycle until the activity was completed. Three observers were used and each observed an equal number of groups at each location.

An observational scale was developed specifically for use in this study. A series of two-digit codes were devised to indicate an action (e.g. manipulate, attend to, play, or communicate) and an object for that action (e.g. activity materials, teacher, setting objects, or peers). In total, the scale was comprised of 9 action and 13 object codes. At each observation time, an action and an object code was written down for both students in a pair. The observer was also responsible for recording weather conditions at the time of the activity since it was felt that they might influence student behavior. Finally, at the end of the activity, observers completed a 9 item semantic differential to record their general impressions of the group's behavior. Scales such as orderly-disorderly, attentive-inattentive, and anxious-calm were included in this instrument.

Results

Cognitive Learning Measures

Pretest

A 3x3x2 analysis of variance performed on the pretest scores revealed a significant initial difference among the places of residence in terms of concept knowledge [$F(2,404)=4.29, p < .025$]. As can be seen in Table 1, the students from suburban schools tended to score higher than either the urban or rural students. No other effects were significant. The reliability of this test, as measured by coefficient alpha, was 0.74.

Post-test

An analysis of the difference between the overall pre-test and post-test means revealed that test scores did increase significantly [$F(1,404)=14.41$, $p < .001$]. The learning effect was further analyzed by examining each of the 9 place of residence (urban, suburban, rural) by activity location (street, park, forest) cells. Multiple comparisons revealed that a significant increase in scores took place in each cell, although the absolute amount varied greatly (see Table 1) (urban-street: $t[40]=4.95$, $p < .001$; urban-park: $t[43]=2.36$, $p < .025$; urban-forest: $t[44]=7.88$, $p < .001$; suburban-street: $t[37]=3.20$, $p < .025$; suburban-park: $t[36]=2.34$, $p < .025$; suburban-forest: $t[34]=5.86$, $p < .001$; rural-street: $t[62]=4.73$, $p < .001$; rural-park: $t[59]=8.80$, $p < .001$; rural-forest: $t[62]=5.66$, $p < .001$). Thus, the students involved in the study generally acquired a significant amount of the cognitive content contained in the field activity in which they participated.

To analyze the pattern of results in the post-test scores, a 3x3x2 analysis of covariance was performed on them, using the pre-test as the covariate. Overall, there was a significant effect for place of residence, [$F(2,403)=3.00$, $p < .05$], in which the urban students performed more poorly than either the suburban or rural children. The scores of students who performed the activity in the forested setting were superior to those of subjects in either the suburban or street parks, as revealed by a significant effect for activity location [$F(2,403)=3.71$, $p < .025$]. A sex effect also emerged in which girls scored significantly higher than boys on the post-test, [$F(1,403)=8.28$, $p < .025$]. Of particular interest, however, was the significant interaction between place of residence and activity location, [$F(4,403)=3.14$, $p < .025$]. Inspection of the means (see Table 1) revealed that while the urban and suburban children showed the most learning in the forested setting, and the least in the suburban park, the rural students showed the greatest cognitive gains in the suburban park.

Affective Data

On the pre-test, all students were asked the multiple-choice question of where they thought it would be easiest to learn about trees. The alternatives were: a) in a park, b) at a greenhouse, c) in a forest, d) in the classroom, e) on a street lined with trees, and f) at home. In general, the students indicated that they thought learning about trees could best be done in a forest (57.4% responded as such). However, analyses of the frequency distributions across response categories for the urban, suburban, and rural children, revealed significant population differences [$\chi^2(8)=20.64$, $p < .01$]. The major effect was that urban and rural students were much more likely than suburban students to indicate that a park was the best place to learn about trees (urban: 26.6%; suburban: 4.8%; rural: 33.3%).

A number of other attitude questions were presented on the post-test in a multiple-choice format. Overall, the students from each type of school and in each activity location liked the activity and thought the experience was fun. Eighty-nine percent of the students indicated that the activity was good or great, and 83.5% said that they had lots of fun on the trip. The overwhelming majority of the children (95.4%) thought that they would remember what they had done in the activity at least fairly well. However, somewhat fewer children (79.8%) thought that it would be easy to recognize the place where they had done the activity if they saw it again. Most of the participants (80.7%) felt that they had learned a good deal from the activity, and less than 1% claimed they had learned nothing at all. Only one post-test attitude question revealed any differences due to the location where the activity was done. The location of the activity was given the highest positive rating by 77.9% of the subjects who did the activity in the forest, by 57% of the students in the suburban park, and by 46.1% of the children who did the activity in the urban location, $\chi^2(2)=11.18$, $p<.01$. No significant differences among the urban, suburban, and rural children emerged in terms of post-trip attitudes. A few attitudinal differences did occur between males and females. Somewhat more girls than boys indicated that they had had a lot of fun on the field trip [86.6% vs. 80.4%, $\chi^2(1)=6.29$, $p<.025$], and girls were more confident that they would remember the activity, [$\chi^2(3)=8.38$, $p<.05$].

Behavioral Data

Only preliminary analyses of the behavioral data are available at this time; however, these data are very suggestive. The detailed observations of each pair of subjects indicated that well over 90% of the time the students were directly involved in the proscribed activity. Students were either gathering information from a tree or watching their partners take measurements so the data could be recorded. Nearly all of the verbalizations that could be understood were task relevant. Disciplining by the instructor occurred in only 4 of the 45 separate groups observed. Although play and exploration were relatively infrequent, there were group and setting differences in terms of these behaviors. In general, the urban children showed the most play behavior with an average of 0.59 episodes per subject, the rural children were next with 0.49 episodes per subject, and the suburban children were the least playful, showing 0.35 episodes per subject. Further, the greatest amount of play behavior tended to be observed in the forest environment, 0.62 episodes per child as opposed to 0.47 episodes per child in the urban setting and 0.21 episodes per child in the suburban park. Exploratory behavior, which was even more rare than play, was, however, observed most frequently in the forest setting (0.07 episodes per child), considerably less often in the suburban park (0.02 episodes per child), and not at all in the urban park.

At the end of the activity, the observer rated the entire group on 9 general behavior scales. In general, all groups were rated as reasonably orderly, interested, and attentive. A complex of being verbally quiet, physically inactive, and cautious emerged. Two groups epitomized these ratings, the rural children in the suburban park and the urban students in the forest. On the other hand, the noisiest, most physically active, and most adventuresome were the rural children in the forest environment. Similarly, the urban group judged noisiest, most active and adventuresome did the activity in the suburban park. Overall, the urban children were rated less interested in the activity.

Discussion

This study demonstrated that both the place of residence of the students involved and the nature of the location for a structured activity can influence the cognitive, affective, and behavioral outcomes of an outdoor science field trip. Student residential background and activity location were also found to interact in a rather complex manner, particularly in regard to the learning and behavioral data. The effects of place of residence can be interpreted in terms of general differences in familiarity with treed environments among the urban, suburban, and rural children. The overall effect of activity location was undoubtedly due to the fact that the sites varied in the number and diversity of relevant examples available to the students for the activity. In addition, the interactions between activity location and place of residence may have been mediated, in part, by the degree of similarity between the field trip sites and the participants' home communities.

The fact that initial group differences among the urban, suburban, and rural children emerged on the pre-test was not surprising. The suburban students scored somewhat better than either their urban or rural cohorts. Although every attempt was made to manipulate only the type of community in which the subjects lived, while holding all other factors constant, it is logically impossible to do so when sampling from three different naturally occurring populations. There could be many reasons why the suburban students scored better on the pre-test. The important point is, however, that the initial group differences in pre-test score did not seem to influence the pattern of results obtained on the post-test.

The first fact that emerges from an examination of the post-test scores is that all groups showed significant positive gain over their pre-test levels. Thus, under certain circumstances at least, students are able to acquire some of the cognitive content of a field trip activity. Although field trips may not be the most efficient mechanisms for cognitive learning, it often does occur and there are many other benefits that can be derived from them.

As predicted, there were significant differences in the adjusted post-test scores obtained from students drawn from the three types of communities. Specifically, the urban children performed more poorly than either the suburban or rural students. One interpretation for this effect is that the urban children were generally the least familiar with treed environments. The performance of the urban students on the post-test probably did not relate to their specific prior knowledge, or lack thereof, of the concept of trees. On the pre-test, the urban children scored no differently from the rural students, who showed the most learning overall. The behavioral data also revealed that the urban students displayed the most peer play and were rated as most anxious. This result is similar to one found by Martin, Falk, and Balling (Note 1) which showed that children were more likely to engage in inter-peer social behavior when placed in an unfamiliar setting. Presumably, this affiliation behavior was designed to reduce the arousal produced by unfamiliar surroundings (Schacter, 19 59). Location of the activity was also found to influence post-test scores. Overall, students who took their field trip in a forested setting tended to score higher than subjects in either the urban or suburban parks. The forested setting had the greatest number, density, and variety of trees which could be used in the task. Thus, the number of relevant examples of the concept to be learned was greatest in the forested setting. Although setting complexity increased with the number of relevant examples present in that site, within the range of locations sampled here, no negative effects of complexity emerged. For most upper elementary children, the locations of typical field trips, such as museums, zoos, or nature centers, probably are not so complex as to be overwhelming (not necessarily so for younger children,(cf. Falk & Balling, Note 3). As a result, the more examples of what is to be learned that are present in a given setting, the better it is for supporting the cognitive goals of the field trip.

The influence of activity location were not confined to an overall effect produced by differences in the number of examples. Activity location and place of residence interacted in that the urban and suburban subjects showed their largest cognitive gains in the forested environment, while the rural students showed the most learning in the suburban park. Such a complex interaction is difficult to interpret in terms of the number of relevant examples available for learning. However, the three activity locations also differed in their similarity to at least certain sites within the students' home communities. Thus, the urban children had had more day-to-day experience with settings similar to the urban park used in the study, particularly when dimensions such as traffic and traffic noise are considered. The suburban children probably had the most contact with suburban park-like settings (in many of their backyards), and the rural children clearly had the opportunity to spend more time in and around forested environments. For the urban children, learning was the best in the setting that was most different from their home environment, namely the forest. One hypothesis for this effect is that, of the settings used in the study, the degree of novelty provided by the forest induced the most appropriate level of arousal for learning on the experimental task by the urban students. The forest setting also provided a level of stimulation which resulted in the greatest cognitive gains for the suburban children. Although both the street park and the forest were different from the environment in their home communities, it seems reasonable to assume that novelty coupled with the effect of number of relevant examples to produce relatively better learning in the forest. The rural students, on the other hand, learned the most in the suburban park and actually did most poorly in the forest. The hypothesis of beneficial arousal induced by changes from one's everyday environment can again be envoked with the restriction that if the setting becomes too impoverished relative to the learning task, performance must decline somewhat. In this regard, it is interesting to note that among those groups who did the activity in the street park, the rural children showed the greatest amount of learning. Thus, the effects of activity location must be interpreted both in terms of the number of relevant examples they provided and their degree of similarity to the students' home community environments.

For a science activity, an unusual sex difference emerged in the data; girls tended to score somewhat higher than boys on the post-test. An examination of the behavioral data provides some explanation for this phenomenon. Virtually all of the non-task behavior observed was attributed to males. The girls were spending more time directly involved in the task, and this fact showed up in their test performance. It is also interesting to note that a significantly greater number of girls than boys reported that the field trip experience was extremely positive.

The attitude questions showed that students obviously enjoy field trips in general and that they feel they learn something from them. In terms of attitudes, the location of a field trip matters in at least two ways. First, students have some preconceived ideas about where it is best to learn about a particular topic. In the present case, subjects thought that a forest was the best place to learn about trees. Students may very likely feel that other non-classroom environments are best for learning other subjects. Although classrooms are convenient, more attention could be paid to this intuition of the students. Many topics may seem more relevant and immediate if taught in an appropriate non-classroom setting. Second, students have definite preferences for various settings which are related to learning. The forest was more highly preferred than either the urban or suburban park, and, overall, the greatest amount of learning took place in the forest.

The preliminary analyses of the behavioral data showed that the overwhelming majority of time during the field trip was spent involved in the activity. The small amount of non-task behavior that was observed, was indulged in by boys. In this regard, it is interesting to note that the group that showed the poorest performance, that is, the urban children in the suburban park, had the largest proportions of males of any group (67%), and non-task behaviors (6.8%). Although the greatest amount of play behavior was seen in the forest setting, a relatively few children were responsible for this phenomenon, so learning did not decline in this setting. In general, certain behaviors were correlated with learning. Those groups who were judged relatively quiet and inactive tended to perform better than those groups who were judged noisy and active. The high scoring rural children in the suburban park and the urban children in the forest were rated the most verbally quiet, physically inactive and cautious; the group rated noisiest, most physically active and most adventuresome were the rural children in the forest, the rural group displaying the smallest pre- to post-test gains. Given the nature of the activity, the quiet, inactive students were probably more involved. Finally, the urban students, who showed the least cognitive gain overall, were judged to be less interested in the activity as a whole. The behavior observations will be analyzed in much greater detail using log-linear models, but the first pass through the data suggested that learning on a field trip is significantly related to certain observable behavioral events.

The data provided no support for the original hypothesis, based on Berlyne's theory (1960) that environmental complexity, which increases directly with the number of examples available in that setting, would tend to influence performance. Apparently, the range of settings used in this study did not vary enough in complexity to reveal such an effect. However, even with a relatively mild manipulation, number of relevant examples was shown to have a significant effect on learning. The relative familiarity the students had with settings relevant to the concepts being presented was also shown to influence learning. Finally, students tended to perform better in settings that still had a sufficient number of examples but that provided some degree of novelty relative to their home community environments. Clearly, the environmental effects of field trip learning are extremely complex.

Teachers should be careful to select sites for field trips that maximize both affective and cognitive learning objectives. Mildly novel and complex sites, like nature centers or museums, appear to satisfy these requirements for upper elementary school aged students. Another recommendation that can be extracted from this study is that students appear to have a fairly accurate sense of where and when learning is most effective. Educators should learn to trust their students' judgment more than they do when selecting educational learning settings.

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Table 1. Pre- and post-test means for each residence group at each activity location.

	Activity Location		
Type of Residence	Street Park	Suburban Park	Forest
Urban			
Pre-Test	8.76	8.48	9.73
Post-Test	11.05	9.91	13.24
Suburban			
Pre-Test	10.84	10.62	9.83
Post-Test	12.56	12.19	12.66
Rural			
Pre-Test	9.66	9.14	9.67
Post-Test	12.37	12.61	12.27

Attitudes towards field trips: A survey of four groups of educators

The science field trip is a three-quarter century old mainstay of American elementary school education. Each year millions of elementary school aged children are bussed to zoos, museums and nature centers. What exactly occurs on these trips, both socially and educationally, is not clear. A smattering of research provides some modicum of information. The relative effectiveness of field-trip activities for accomplishing specific learning outcomes is a case in point. Studies by various investigators comparing field trip learning to classroom learning have had mixed results. In many cases museum experiences did not significantly increase cognitive learning more than a comparable classroom lesson (c.f. review on field trips, Koran and Baker, 1979), while in other situations cognitive gains are made (Balling & Falk, Note 1; Falk & Balling, Note 2). Results of improvement of attitude or appreciation toward a specific subject matter have been more consistently positive (e.g. Bloomberg, 1929; Koran & Baker, 1979; Falk, Martin & Balling, 1978; Brady, 1972; Balling & Falk, Note 1; Falk & Balling, Note 2). Clearly, additional studies of this nature are needed to clarify these and other questions relating to field trips. From another perspective, an equally important task is understanding what current practitioners think about such science field trip experiences. Disparities between an educator's intuitions and the actual facts of field trip learning and behavior would, for example, be critical to recognize for practical reasons. At a more theoretical level, in order to understand what happens on a field trip, the behavioral scientist must have some knowledge of the underlying assumptions and biases of the participating teachers or guides. These people exert a good deal of control over the students on the trip and they probably have some very specific goals, although they may be implicit rather than explicit. At the present time, there are no systematic data on why teachers take their classes on field trips or what they expect their students to get out of it. The study reported here, was an attempt to rectify this situation.

A survey questionnaire was used to obtain the perceptions of and attitude toward field trips of four classes of educators who have a direct impact on science field trips. Elementary classroom teachers who have gone on field trips, school administrators responsible for alloting funds for field trips and scheduling them, collegiate instructors of methods in science education, who are in a position to encourage or discourage field trip taking, and leaders of nature centers who work directly with children on field trips, were all tapped in a nationwide survey. Questionnaires were mailed to a representative sample from each of these four groups.

Methods

Design - The questionnaire was designed to answer a number of different questions: 1) Where are field trips taken and why are these locations selected; 2) What are the perceived values of the field trip experience in general; 3) What kinds of preparation should be given to the students before a successful field trip - how much is actually done; 4) What are the effects of a field trip experience - both short and long-term; 5) What controls student behavior on a field trip - the environment, internal arousal, the leader, and 6) What makes a good trip - what makes a bad trip? Several multiple choice items were directed toward each of these general questions. The questionnaire included a total 61 questions divided into four sections.

The first 48 questions utilized a Likert scale, ranked from a +3, strong support or agreement, to a -3, strong opposition or disagreement. Items 49-51 involved more rating (+3 to -3) of statements and in some cases additionally required an estimate of percentage of the time that an action or event actually occurred on science field trips. The third section, items 52-55, was all multiple choice, and the final items required the subject to rank order choices according to specified criteria. The questionnaire in addition, included a background section where the subject could indicate their position, age, years of experience, etc. A section at the end of the questionnaire allowed subjects to give unstructured feedback to the researchers. A sample questionnaire is included as Appendix A.

The questionnaires were mailed out in March of 1978. Returns were accepted through June of the same year. A stamped self-addressed envelope for mailing the filled out questionnaire was included with each copy of the instrument.

Samples - Four different populations were sampled - elementary school teachers, elementary school administrators, college instructors in science education, and leaders of nature centers. Mailing lists for these various groups were obtained from three sources. First, the Smithsonian Institution possesses a list of approximately 500 elementary school teachers who have taken their classes on field trips over the last two years. The list is representative both in terms of the geographic regions and the socio-economic strate sampled. It is a nationwide sample and is not restricted to teachers who have used Smithsonian facilities. A total of 481 questionnaires were mailed out to teachers. In order to best compare teacher and administrators responses to the questionnaire, forms were mailed to administrators in the same school districts as the teachers (485 distributed). After obtaining a list of all the schools of education in the country, a random sample was taken; 621 questionnaires were then sent to randomly selected instructors of methods in science education at each institution. Finally, in order to obtain the viewpoint of science education leaders, at sites where classes go on field trips, a list of nature centers was obtained with the help of the Natural Science for Youth Foundation. Forms were mailed to the leaders of 308 randomly picked centers nationwide. A total of 1,895 questionnaires in all were mailed.

Results

A total of 784 questionnaires were returned, a return percentage of 42%. Overall, teachers were the most responsive, with a return rate of 60.1% (289/481), followed by nature center leaders 55.2% (170/308), then administrators with a 42.3% return (205/485), with the least responsive being college methods instructors, 19.3% (120/621).

The results for questions 1 through 48 are summarized in Table 1. For each question the mean response (+3 = strong support or agreement; +2 = moderate support or agreement, +1 = slight support or agreement; -1 = slight opposition or disagreement; -2 = moderate opposition or disagreement; -3 = strong opposition or disagreement) and standard deviation are listed for each of the four groups surveyed and a pooled response of all groups.

Questions 49 through 51 are summarized in Table 2. Means and standard deveiations, plus mean percentage of time each item is actually practiced are reported for each group.

Tables 3 through 33 are histograms for questions 52 through 55. These were multiple choice questions. Responses to questions 56-59 are given in Table 34. The questions called for items to be rank ordered and, in some cases, responsdents were asked to estimate the percentage of time each item was actually practiced. The numbers in Table 34 represent the actual ranking of each item (1, 2, 3, etc.), the mean ranking it received, mean percentage, and standard deviation for rankings and percentages.

In order to determine whether the four populations to which the questionnaire was sent were different in any way, a preliminary discriminant analysis was performed on the data from the first forty-eight items. The Wilks' lambda minimization procedure was used to determine which variables would be included in the analysis. Table 35 reports the standardized discriminant function coefficients obtained from the analysis.

Discussion

Inspection of the means in Tables 1-34 and of the discriminant function coefficients revealed that, in general, the four groups of educators -- teachers, school administrators, college science methods instructors, and nature center tour leaders -- differ relatively little in their attitudes toward field trips. With few exceptions, there appears to be a consensus of opinion among educators regarding the role and the educational outcomes of elementary school science field trips in the United States. Therefore, the data from the four populations were compliled, and the preliminary conclusions discussed below apply to the group as a whole.

The results of this survey clearly indicate that educators generally have a very positive attitude toward science field trips. The most important benefits to be derived from field trips are thought to be attitudinal and motivational, for both students and teachers. Field trips are seen as helping to improve student attitudes toward science and to enhance their motivation to learn science. The trips also make teaching science more enjoyable for the classroom instructors.

The second most important set of benefits obtained from field trips have to do with cognitive learning. All groups showed moderate agreement with the notion that more science could be learned on a field trip than in the classroom. According to these educators, the critical aspect of a field trip that makes them valuable for cognitive learning is the opportunity for real-world experiences. A corollary of this assertion is that field trips can help make the relationship between classroom lessons and the real world explicit. Field experiences are generally thought to enhance the quality of science education in the public schools.

According to the educators sampled, another major benefit of field experiences is that they can help improve the social climate in a class, both between the teacher and the students, as well as among the students themselves. The trips provide an opportunity for cooperative learning, and they allow teachers to relate to students in a more informal context. However, there is some doubt as to whether this change in social atmosphere persists after the trip to affect classroom behavior.

The questionnaire data suggested that educators are fairly satisfied with the status quo in terms of the number of field trips taken per year, generally reported as two to six times a year. Further, most agree that, as presently occurs, classroom teachers should take the major responsibility for organizing field trips. In order to prepare for a successful field trip, the two most important things teachers should do are: a) brush up on the general topic to be covered on the trip, and b) previsit the trip site. The two most important preparation items for students are being told where they are going and what to expect and studying trip relevant material as part of the curriculum. From the point of view of the institutions which receive the students on field trips, it was thought that they could best insure successful trips to their site by developing educational activities and by providing well-trained group leaders.

On the negative side of the ledger, there was general agreement that the cost of transportation was the greatest impediment to field trips. Surprisingly, the next most significant impediment was seen as general inertia on the part of teachers, even as rated by teachers themselves! Somewhat less serious impediments were lack of both administrative support for field trips and curriculum flexibility. Similar intermediate ratings were given to teacher insecurity about field trips and the absence of teacher training specifically dealing with field trips. The most unimportant impediments to field trips were thought to be the absence of worthwhile places to go and student inability to deal with the field trip situation.

Finally, according to this sample, the most frequently visited sites for science field trips are nature centers, followed by school yards, museums, local parks and finally local businesses or industries. With regard to this ranking of the frequency of actual visits, it is interesting to note that the science methods instructors suggested that school yards be used most often. Apparently, the current doctrine in science education concerning the advantages of making regular use of the most readily available real world resources has not completely permeated present-day educational practice.

Detailed analysis of the questionnaire results is currently in progress. A more complete discussion of these data will be submitted as an addendum to this report.

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Table 1.

Question	Teacher		Administrator		Methods Instructors		Nature Center Leader		All	
		S.D.		S.D.		S.D.		S.D.		S.D.
1	1.0	1.9	0.9	1.9	-0.3	1.9	0.3	2.0	0.6	2.0
2	1.1	1.5	1.3	1.4	1.3	1.7	1.2	1.5	1.2	1.5
3	2.6	0.7	2.6	0.6	2.7	1.0	2.7	0.6	2.7	0.7
4	2.5	0.8	2.5	0.8	2.4	2.8	2.6	0.9	2.5	1.3
5	-2.2	1.4	-2.4	1.1	-2.4	1.0	-2.7	0.7	-2.4	1.2
6	-0.4	2.0	-0.5	1.8	-0.4	1.9	0.4	1.8	-0.3	1.9
7	0.0	1.6	0.3	1.5	0.0	1.5	0.2	1.3	0.1	1.5
8	0.7	1.9	0.6	1.8	0.6	2.6	0.5	1.8	0.6	2.0
9	2.3	0.9	2.2	1.0	2.2	0.8	2.3	0.8	2.3	0.9
10	2.3	1.0	2.6	0.6	2.7	0.5	2.7	0.7	2.5	0.8
11	0.2	1.9	0.3	1.7	-0.2	1.6	0.3	1.7	0.2	1.7
12	0.7	1.8	0.4	1.8	0.1	1.6	1.1	1.6	0.6	1.8
13	0.5	1.8	0.0	1.7	0.2	1.6	1.1	2.0	0.5	1.8
14	2.4	0.7	2.5	0.7	2.4	0.7	2.4	0.8	2.4	0.7
15	-0.4	2.0	-0.5	1.8	-0.4	1.7	-0.5	1.9	-0.5	2.0
16	1.5	1.2	1.6	1.1	1.7	1.1	1.8	1.0	1.6	1.1
17	-0.8	1.7	-0.7	1.5	-0.6	1.6	0.2	1.8	-0.6	1.7
18	-1.5	1.5	-1.4	1.5	-1.3	1.6	-1.3	1.5	-1.4	1.5
19	2.6	0.7	2.6	0.6	2.6	0.5	2.7	0.5	2.6	0.6
20	0.5	1.9	-0.1	1.9	0.2	1.7	0.8	1.7	0.3	1.9
21	-0.9	1.9	-0.6	1.9	-0.8	1.8	-1.0	1.8	-0.8	1.9
22	1.8	1.5	2.1	1.1	1.8	1.3	2.1	1.1	1.9	1.3
23	2.1	1.1	2.0	1.0	1.9	0.9	2.2	0.9	2.1	1.0
24	2.4	0.9	2.5	0.7	2.4	0.7	2.7	0.6	2.5	0.7
25	0.5	1.9	0.8	1.6	0.6	1.5	1.1	1.7	0.7	1.7
26	1.6	1.4	1.6	1.1	1.7	1.0	1.9	2.4	1.7	1.6
27	1.5	1.5	1.4	1.4	1.3	1.4	0.9	1.8	1.3	1.5
28	-0.1	1.8	0.1	1.6	0.5	1.4	0.3	1.6	0.1	1.7
29	1.3	1.3	1.0	1.4	1.4	1.2	1.7	1.9	1.3	1.5
30	1.0	1.8	1.2	1.6	1.1	1.8	1.2	2.3	1.2	1.9

Table 1. (con't)

Question	Teacher		Administrator		Methods Instructors		Nature Center Leader		All	
		S.D.		S.D.		S.D.		S.D.		S.D.
31	0.8	1.6	0.5	1.4	0.6	1.4	1.0	1.3	0.7	1.5
32	1.3	1.5	1.2	1.5	1.6	1.0	2.1	2.5	1.5	1.7
33	1.6	1.1	1.3	1.1	1.6	0.9	1.5	2.5	1.5	1.5
34	2.0	1.1	2.1	0.8	2.0	0.9	2.0	0.9	2.0	0.9
35	1.8	1.2	2.0	1.2	2.2	0.9	2.2	2.4	2.0	1.5
36	2.3	1.0	2.4	0.9	2.6	0.6	2.6	0.7	2.4	0.9
37	-1.0	1.7	-0.7	1.8	-1.0	1.8	-1.2	2.3	-1.0	1.9
38	2.2	0.9	2.2	0.8	2.1	0.8	2.3	2.4	2.2	1.3
39	2.0	1.1	1.9	1.3	2.2	0.9	2.0	1.1	2.0	1.1
40	-2.6	0.9	-2.8	0.6	-2.8	0.5	-2.9	0.6	-2.7	0.7
41	-1.1	1.6	-1.5	1.3	-1.3	1.2	-0.9	1.5	-1.2	1.4
42	-0.9	1.7	-1.2	1.5	-0.8	1.5	-0.7	1.8	-0.9	1.6
43	1.7	1.2	1.7	1.1	2.1	0.9	1.8	1.0	1.8	1.1
44	-0.4	1.8	-0.7	1.5	-0.9	1.4	-0.5	1.6	-0.6	1.6
45	-0.1	1.8	-0.4	1.6	0.2	1.6	0.4	1.6	0.0	1.7
46	-2.5	1.0	-2.5	0.8	-2.5	0.7	-2.4	2.1	-2.5	1.3
47	1.7	1.4	1.7	1.5	1.9	1.2	1.7	1.4	1.7	1.4
48	-1.6	1.4	-1.8	1.3	-1.9	1.2	-1.8	2.8	-1.8	1.7

Table 2

Question	Teacher $\bar{x}$	SD	%	SD	Administrator $\bar{x}$	SD	%	SD
49a	2.1	1.2	55	33.1	2.3	0.9	46	28.0
b	1.8	1.4	42	31.1	2.1	1.1	40	29.3
c	2.1	1.1	54	31.9	2.2	1.0	44	31.1
d	2.6	0.6	72	27.0	2.6	0.6	63	25.2
e	1.9	1.4	59	31.2	2.2	1.2	55	30.5
50a	2.7	0.6			2.7	0.8		
b	2.7	0.7			2.7	0.8		
c	1.7	1.3			2.0	1.2		
d	1.5	1.5			2.0	1.2		
e	1.9	1.8			2.2	1.1		
51a	2.5	0.7			2.4	0.6		
b	1.7	1.0			1.8	0.9		
c	1.1	1.6			0.9	1.6		
d	1.3	1.4			0.9	1.5		
e	1.2	1.5			0.9	1.4		
f	1.4	1.3			1.8	1.0		
g	1.6	1.2			1.6	1.0		
h	1.5	0.8			1.7	0.7		
i	2.2	1.1			2.1	1.2		

38

Table 2 (con't)

Question	Methods Instructors				Nature Center Leader				All			
	$\bar{x}$	SD	%	SD	$\bar{x}$	SD	%	SD	$\bar{x}$	SD	%	SD
49a	2.8	0.5	45	26.6	2.3	0.8	30	28.9	2.3	1.0	46	31.3
b	1.9	1.3	29	24.0	2.1	1.1	33	32.4	2.0	1.3	37	30.3
c	2.2	0.9	36	26.6	2.0	1.0	32	30.6	2.1	1.0	44	31.9
d	2.4	0.7	53	26.4	2.4	0.8	48	25.9	2.5	0.7	62	27.8
e	2.4	0.8	51	28.1	1.7	1.4	36	26.9	2.0	1.3	52	30.8
50a	2.6	0.6			2.7	0.8			2.7	0.7		
b	2.9	2.7			2.7	0.8			2.7	1.3		
c	2.1	1.1			1.7	1.3			1.8	1.2		
d	1.9	1.1			1.5	1.4			1.7	1.4		
e	2.7	1.9			2.0	1.1			2.1	1.5		
51a	2.6	0.5			2.4	0.6			2.5	0.7		
b	1.8	0.8			1.7	1.0			1.8	1.0		
c	1.1	1.4			0.5	1.5			0.9	1.5		
d	1.1	1.3			0.5	1.5			1.0	1.5		
e	0.7	1.6			0.9	1.4			1.0	1.5		
f	1.5	1.2			1.8	1.0			1.6	1.2		
g	1.9	1.0			1.4	0.8			1.6	1.1		
h	1.5	0.9			1.4	1.1			1.5	0.8		
i	2.3	0.9			2.3	2.1			2.2	1.1		

NSF QUESTIONAIRE STUDY

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SUBFILE   TCHR

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                  I
                  I
              3. ************************* (   243)
                  I
                  I
                  I
           9999. ** (       5)
       (MISSING) I
                  I
                  I.........I.........I.........I.........I.........I
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                  FREQUENCY
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MODE   3.000

VALID CASES   284   MISSING CASES   5

40

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            I
            I
       3.   ******************************************* (    159)
            I
            I
            I
       4.   ************* (      49)
            I
            I
            I
       5.   ******** (      29)
            I
            I
            I
       6.   ****** (      20)
            I
            I
            I
       7.   * (       1)
            I
            I
            I
    9999.   ** (       5)
 (MISSING)  I
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            I.........I.........I.........I.........I.........I
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            FREQUENCY


MODE          3.000

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NSF QUESTIONAIRE STUDY

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SUBFILE TCHR

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           I
           I
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           I
           I
           I
        3. **************************************************** (    172)
           I
           I
           I
        4. ********* (     30)
           I
           I
           I
        5. ******* (     23)
           I
           I
           I
        6. ** (      4)
           I
           I
           I
        7. ** (      3)
           I
           I
           I
     9999. *** (      6)
 (MISSING) I
           I
           I.........I.........I.........I.........I.........I
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                              FREQUENCY

MODE             3.000

VALID CASES      283        MISSING CASES      6
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NSF QUESTIONAIRE STUDY

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               I
               I
          3.   *** (       7)
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               I
               I
          4.   ************* (      47)
               I
               I
               I
          5.   *********** (      39)
               I
               I
               I
       9999.   ** (       3)
   (MISSING)   I
               I
               I.........I.........I.........I.........I.........I
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               FREQUENCY

MODE              2.000

VALID CASES       286        MISSING CASES       3
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NSF QUESTIONAIRE STUDY

FILE BALLING3 (CREATION DATE = 05/04/79)
SUBFILE TCHR

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           I
           I
       3.  * (      2)
           I
           I
           I
       4.  * (      2)
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           I
           I
       5.  *** (     16)
           I
           I
           I
       6.  *** (     21)
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           I
           I
    9999.  * (      3)
 (MISSING) I
           I
           I.........I.........I.........I.........I.........I
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           FREQUENCY
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MODE 1.000

VALID CASES 286 MISSING CASES 3

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SUBFILE TCHR

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                 I
                 I
             4.  ** (     8)
                 I
                 I
                 I
             5.  * (     2)
                 I
                 I
                 I
             6.  *** (    15)
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                 I
                 I
          9999.  ** (     8)
      (MISSING)  I
                 I
                 I.........I.........I.........I.........I.........I
                 0        100       200       300       400       500
                 FREQUENCY
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MODE 1.000

VALID CASES 281 MISSING CASES 8

NSF QUESTIONAIRE STUDY

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             I
             I
          2. *** (      7)
             I
             I
             I
          3. ************************************************ (    183)
             I
             I
             I
       9999. * (      1)
   (MISSING) I
             I
             I.........I.........I.........I.........I.........I
             0        40        80       120       160       200
             FREQUENCY
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MODE   3.000

VALID CASES   204   MISSING CASES   1

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NSF QUESTIONAIRE STUDY

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              I
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              I
              I
           4. ************ (       44)
              I
              I
              I
           5. ***** (      16)
              I
              I
              I
           6. ** (        2)
              I
              I
              I
           7. ** (        3)
              I
              I
              I
        9999. *** (        6)
   (MISSING)  I
              I
              I.........I.........I.........I.........I.........I
              0        40        80       120       160       200
              FREQUENCY

MODE         3.000

VALID CASES     199      MISSING CASES      6
```

```
NSF QUESTIONAIRE STUDY

FILE    BALLING3 (CREATION DATE = 05/04/79)
SUBFILE    ADMN

Q53B
      CODE
               I
            1. * (       1)
               I
               I
               I
            2. ******* (      23)
               I
               I
               I
            3. **************************** (      105)
               I
               I
               I
            4. ***** (      15)
               I
               I
               I
            5. *** (       3)
               I
               I
               I
            6. * (       1)
               I
               I
               I
            7. ** (       2)
               I
               I
               I
         9999. ************** (      50)
     (MISSING) I
               I
               I.........I.........I.........I.........I.........I
               0        40        80       120       160       200
               FREQUENCY


 MODE            3.000

 VALID CASES     155       MISSING CASES     50
```

NSF QUESTIONAIRE STUDY

```
FILE    BALLING3  (CREATION DATE = 05/04/79)
SUBFILE    ADMN

Q54
      CODE
             I
          1. *********  (      32)
             I
             I
             I
          2. *********************************** (    136)
             I
             I
             I
          3. **  (       2)
             I
             I
             I
          4. *****  (      15)
             I
             I
             I
          5. *****  (      17)
             I
             I
             I
          6. *  (       1)
             I
             I
             I
       9999. **  (       2)
   (MISSING) I
             I
             I.........I.........I.........I.........I.........I
             0        40        80       120       160       200
             FREQUENCY

MODE           2.000

VALID CASES       203        MISSING CASES       2
```

NSF QUESTIONAIRE STUDY

FILE   BALLING3 (CREATION DATE = 05/04/79)
SUBFILE   ADMN

```
Q55A
       CODE
                 I
             1.  ******************************************** (    167)
                 I
                 I
                 I
             2.  ** (      2)
                 I
                 I
                 I
             4.  ** (      2)
                 I
                 I
                 I
             5.  **** (     10)
                 I
                 I
                 I
             6.  ******* (     23)
                 I
                 I
                 I
         9999.   * (      1)
      (MISSING)  I
                 I
                 I.........I.........I.........I.........I.........I
                 0        40        80       120       160       200
                 FREQUENCY
```

MODE   1.000

VALID CASES   204   MISSING CASES   1

```
NSF QUESTIONAIRE STUDY

FILE     BALLING3  (CREATION DATE = 05/04/79)
SUBFILE      ADMN

Q55B
        CODE
               I
           1.  *************************************** (     164)
               I
               I
               I
           4.  *** (       6)
               I
               I
               I
           6.  ****** (      20)
               I
               I
               I
       9999.   ***** (      15)
    (MISSING)  I
               I
               I.........I.........I.........I.........I.........I
               0        40        80       120       160       200
               FREQUENCY

MODE             1.000

VALID CASES       190        MISSING CASES      15
```

```
FILE    BALLINGS (CREATION DATE = 05/04/79)
SUBFILE   PROF

Q52
      CODE
                I
          1.  ** (       3)
                I
                I
                I
          2.  *** (       6)
                I
                I
                I
          3.  ***************************** (    108)
                I
                I
                I
          4.  * (        1)
                I
                I
                I
       9999.  ** (       2)
   (MISSING)  I
                I
                I.........I.........I.........I.........I.........I
                0        40        80       120       160       200
                FREQUENCY

MODE               3.000

VALID CASES      118        MISSING CASES       2
```

```
FILE    BALLING3 (CREATION DATE = 05/04/79)
SUBFILE    PROF

Q53A
      CODE
           I
     2.    ** (      1)
           I
           I
           I
     3.    ****************************** (     57)
           I
           I
           I
     4.    ************ (     22)
           I
           I
           I
     5.    ************ (     22)
           I
           I
           I
     6.    ******* (     11)
           I
           I
           I
     7.    ** (      2)
           I
           I
           I
  9999.    **** (      5)
(MISSING)  I
           I
           I.........I.........I.........I.........I.........I
           0        20        40        60        80       100
           FREQUENCY

MODE          3.000

VALID CASES      115        MISSING CASES      5
```

NSF QUESTIONAIRE STUDY

FILE BALLING3 (CREATION DATE = 05/04/79)
SUBFILE PROF

```
Q53B
     CODE
              I
          1.  ** (      1)
              I
              I
              I
          2.  ******* (      6)
              I
              I
              I
          3.  ************************************************** (     46)
              I
              I
              I
          4.  ************************* (     23)
              I
              I
              I
          5.  ************ (     11)
              I
              I
              I
          6.  ******** (      7)
              I
              I
              I
          7.  **** (      3)
              I
              I
              I
       9999.  ************************* (     23)
   (MISSING)  I
              I
              I.........I.........I.........I.........I.........I
              0        10        20        30        40        50
              FREQUENCY

MODE            3.000

VALID CASES        97      MISSING CASES     23
```

```
FILE     BALLING3 (CREATION DATE = 05/04/79)
SUBFILE     PROF

Q54
     CODE
           I
       1.  ************* (      23)
           I
           I
           I
       2.  *********************************** (      66)
           I
           I
           I
       3.  ** (      1)
           I
           I
           I
       4.  ******* (      12)
           I
           I
           I
       5.  ********* (      16)
           I
           I
           I
    9999.  ** (      2)
 (MISSING) I
           I
           I.........I.........I.........I.........I.........I
           0        20        40        60        80       100
           FREQUENCY

MODE            2.000

VALID CASES      118      MISSING CASES       2
```

NSF QUESTIONAIRE STUDY

FILE BALLING3 (CREATION DATE = 05/04/79)
SUBFILE PROF

```
Q55A
        CODE
                 I
           1.    ************************************************** (    98)
                 I
                 I
                 I
           5.    **** (      6)
                 I
                 I
                 I
           6.    ******** (     13)
                 I
                 I
                 I
        9999.    *** (      3)
    (MISSING)    I
                 I
                 I.........I.........I.........I.........I.........I
                 0        20        40        60        80       100
                 FREQUENCY
```

```
MODE                1.000

VALID CASES       117        MISSING CASES       3
```

NSF GUESTIONAIRE STUDY

FILE   BALLING3 (CREATION DATE = 05/04/79)
SUBFILE   PROF

```
Q55B
     CODE
           I
        1. ***************************************** (      82)
           I
           I
           I
        4. ** (      2)
           I
           I
           I
        5. ** (      1)
           I
           I
           I
        6. **** (      5)
           I
           I
           I
     9999. *************** (      29)
 (MISSING) I
           I
           I.........I.........I.........I.........I.........I
           0        20        40        60        80       100
           FREQUENCY
```

MODE   1.000

VALID CASES   91   MISSING CASES   29

FILE BALLING3 (CREATION DATE = 05/04/79)
SUBFILE NTRC

Q52

```
  CODE
          I
      1.  **** (      13)
          I
          I
          I
      2.  *** (       6)
          I
          I
          I
      3.  *************************************** (    143)
          I
          I
          I
      4.  * (       1)
          I
          I
          I
   9999.  *** (       7)
(MISSING) I
          I
          I.........I.........I.........I.........I.........I
          0        40        80       120       160       200
          FREQUENCY
```

MODE 3.000

VALID CASES 163 MISSING CASES 7

```
FILE     BALLING3 (CREATION DATE = 05/04/79)
SUBFILE    NTRC

Q53A
      CODE
            I
        1.  ** (        2)
            I
            I
            I
        2.  **** (        5)
            I
            I
            I
        3.  ******************************** (      60)
            I
            I
            I
        4.  ********************** (      42)
            I
            I
            I
        5.  ****************** (      34)
            I
            I
            I
        6.  ************ (      22)
            I
            I
            I
        7.  ** (        2)
            I
            I
            I
     9999.  *** (        3)
  (MISSING) I
            I
            I.........I.........I.........I.........I.........I
            0        20        40        60        80       100
            FREQUENCY

MODE            3.000

VALID CASES     167      MISSING CASES     3
```

NSF QUESTIONAIRE STUDY

FILE BALLING3 (CREATION DATE = 05/04/79)
SUBFILE NTRC

```
Q53B
          CODE
                 I
             2.  *** (        8)
                 I
                 I
                 I
             3.  ****** (      19)
                 I
                 I
                 I
             4.  **** (       11)
                 I
                 I
                 I
             5.  *** (        9)
                 I
                 I
                 I
             6.  *** (        8)
                 I
                 I
                 I
             7.  ** (         2)
                 I
                 I
                 I
          9999.  ***************************** (     113)
      (MISSING)  I
                 I
                 I.........I.........I.........I.........I.........I
                 0        40        80       120       160       200
                 FREQUENCY
```

MODE 3.000

VALID CASES 57 MISSING CASES 113

NSF QUESTIONAIRE STUDY

FILE BALLING3 (CREATION DATE = 05/04/79)
SUBFILE NTRC

```
Q54
        CODE
                  I
          1.      ********* (       16)
                  I
                  I
                  I
          2.      *************************************** (      74)
                  I
                  I
                  I
          3.      ******* (      11)
                  I
                  I
                  I
          4.      ***************** (       31)
                  I
                  I
                  I
          5.      ****************** (      34)
                  I
                  I
                  I
       9999.      *** (       4)
   (MISSING)      I
                  I
                  I.........I.........I.........I.........I.........I
                  0        20        40        60        80       100
                  FREQUENCY
```

MODE 2.000

VALID CASES 166 MISSING CASES 4

```
FILE    BALLING3 (CREATION DATE = 05/04/79)
SUBFILE    NTRC

Q55A
      CODE
               I
           1.  ************************************* (    146)
               I
               I
               I
           4.  * (      1)
               I
               I
               I
           5.  *** (      9)
               I
               I
               I
           6.  *** (      9)
               I
               I
               I
        9999.  ** (      5)
    (MISSING)  I
               I
               I.........I.........I.........I.........I.........I
               0        40        80       120       160       200
               FREQUENCY

MODE            1.000

VALID CASES      165        MISSING CASES        5
```

```
NSF QUESTIONAIRE STUDY

FILE     BALLING3  (CREATION DATE = 05/04/79)
SUBFILE    NTRC


Q55B
        CODE
                 I
           1.    ************* (      49)
                 I
                 I
                 I
           2.    ** (      2)
                 I
                 I
                 I
           4.    ** (      2)
                 I
                 I
                 I
           6.    ** (      2)
                 I
                 I
                 I
        9999.    ****************************** (     115)
   (MISSING)     I
                 I
                 I.........I.........I.........I.........I.........I
                 0        40        80       120       160       200
                 FREQUENCY


MODE              1.000

VALID CASES        55       MISSING CASES    115
```

```
FILE    BALLING3 (CREATION DATE = 05/04/79)
SUBFILE    TCHR        ADMN        PROF        NTRC

Q52
      CODE
              I
         1.   **** (      55)
              I
              I
              I
         2.   *** (      35)
              I
              I
              I
         3.   ********************************** (     677)
              I
              I
              I
         4.   * (       2)
              I
              I
              I
      9999.   ** (      15)
  (MISSING)   I
              I
              I.........I.........I.........I.........I.........I
              0        200       400       600       800      1000
              FREQUENCY

MODE            3.000

VALID CASES      769        MISSING CASES     15
```

NSF QUESTIONAIRE STUDY

```
FILE     BALLING3 (CREATION DATE = 05/04/79)
SUBFILE   TCHR          ADMN         PROF         NTRC

Q53A
      CODE
            I
         1. * (      2)
            I
            I
            I
         2. ***** (     42)
            I
            I
            I
         3. ******************************************** (    400)
            I
            I
            I
         4. ****************** (    157)
            I
            I
            I
         5. ************ (    101)
            I
            I
            I
         6. ******* (     55)
            I
            I
            I
         7. ** (      8)
            I
            I
            I
      9999. *** (     19)
  (MISSING) I
            I
            I.........I.........I.........I.........I.........I
            0        100       200       300       400       500
            FREQUENCY

MODE          3.000

VALID CASES     765      MISSING CASES     19
```

```
FILE     BALLING3 (CREATION DATE = 05/04/79)
SUBFILE    TCHR        ADMN        PROF        NTRC

Q53B
     CODE
           I
        1. ** (      6)
           I
           I
           I
        2. ********* (      84)
           I
           I
           I
        3. ************************************ (     342)
           I
           I
           I
        4. ********* (      79)
           I
           I
           I
        5. ****** (      51)
           I
           I
           I
        6. *** (      20)
           I
           I
           I
        7. ** (      10)
           I
           I
           I
     9999. ******************** (     192)
 (MISSING) I
           I
           I.........I.........I.........I.........I.........I
           0        100       200       300       400       500
           FREQUENCY

MODE          5.000

VALID CASES      592      MISSING CASES     192
```

```
FILE     BALLING3 (CREATION DATE = 05/04/79)
SUBFILE   TCHR        ADMN        PROF        NTRC

Q54
     CODE
          I
       1. *********** (     102)
          I
          I
          I
       2. ********************************************** (     438)
          I
          I
          I
       3. *** (     21)
          I
          I
          I
       4. ************ (     105)
          I
          I
          I
       5. ************ (     106)
          I
          I
          I
       6. * (     1)
          I
          I
          I
    9999. ** (     11)
 (MISSING) I
          I
          I.........I.........I.........I.........I.........I
          0        100       200       300       400       500
          FREQUENCY

MODE           2.000

VALID CASES      773        MISSING CASES     11
```

NSF QUESTIONAIRE STUDY

```
FILE    BALLING3 (CREATION DATE = 05/04/79)
SUBFILE    TCHR         ADMN         PROF         NTRC

Q55A
     CODE
          I
       1. ********************************** (     654)
          I
          I
          I
       2. * (      4)
          I
          I
          I
       3. * (      2)
          I
          I
          I
       4. * (      5)
          I
          I
          I
       5. *** (     41)
          I
          I
          I
       6. **** (     66)
          I
          I
          I
    9999. ** (     12)
(MISSING) I
          I
          I.........I.........I.........I.........I.........I
          0        200       400       600       800      1000
          FREQUENCY

MODE          1.000

VALID CASES       772       MISSING CASES     12
```

```
FILE     BALLING3  (CREATION DATE = 05/04/79)
SUBFILE    TCHR          ADMN          PROF          NTRC


Q55B
      CODE
             I
          1. ****************************** (    550)
             I
             I
             I
          2. * (      3)
             I
             I
             I
          4. ** (     18)
             I
             I
             I
          5. * (      3)
             I
             I
             I
          6. *** (     43)
             I
             I
             I
       9999. ********* (    167)
   (MISSING) I
             I
             I.........I.........I.........I.........I.........I
             0        200       400       600       800      1000
             FREQUENCY


MODE            1.000

VALID CASES      617       MISSING CASES    167
```

Table 34

Question	Item Rank	Teacher Ltr*	$\bar{x}$	SD	%	SD	Administrator Ltr	$\bar{x}$	SD	%	SD	Methods Instructor Ltr	$\bar{x}$	SD	%	SD
56	#1	a	2.8	2.3			a	2.7	2.2			b	2.7	1.7		
	2	b	3.9	2.2			b	3.2	2.0			c	3.4	1.7		
	3	e	4.5	2.1			h	4.3	2.2			a	3.4	2.2		
	4	c	4.6	2.4			d	4.3	1.7			h	4.1	1.9		
	5	d	4.7	1.9			e	5.2	2.0			e	4.3	1.4		
	6	h	5.0	2.3			c	5.3	2.2			d	4.3	1.8		
	7	f	5.6	2.4			f	5.8	2.3			g	6.6	1.3		
	8	g	5.6	2.0			g	5.9	1.7			f	7.2	1.4		
57	1	f	2.2	1.6	90	18.7	d	2.3	1.4	71	23.9	d	2.4	1.5	50	28.3
	2	d	2.5	1.4	72	26.3	f	2.4	1.8	86	21.9	f	2.8	1.9	76	23.2
	3	c	3.3	1.4	59	31.4	c	3.5	1.4	53	26.5	c	3.2	1.4	39	27.7
	4	a	3.5	1.6	52	29.4	a	3.7	1.7	53	28.0	e	3.6	1.6	38	27.1
	5	e	4.1	1.7	51	33.2	e	3.8	1.6	54	30.2	a	4.1	1.5	38	24.6
	6	b	4.4	1.5	36	33.5	b	4.6	1.5	35	31.9	b	4.6	1.6	24	24.6
58	1	e	2.2	1.4	65	22.0	e	2.0	1.2	65	21.2	e	1.9	1.2	60	24.2
	2	a	2.3	1.3	69	21.9	a	2.3	1.3	69	20.3	a	3.0	1.5	61	21.6
	3	d	3.1	1.5	65	24.0	f	2.9	1.3	61	23.8	f	3.1	1.4	50	24.7
	4	f	3.2	1.4	59	23.2	d	3.2	1.3	65	23.0	d	3.2	1.5	58	21.4
	5	b	4.2	1.5	74	24.5	b	4.7	1.2	71	27.3	b	4.6	1.2	68	24.2
	6	c	5.2	1.4	80	27.7	c	5.4	1.2	79	29.3	c	5.3	1.2	82	24.1
59	1	c	2.3	1.3			c	2.2	1.2			e	2.0	1.4		
	2	e	2.7	1.7			b	2.8	1.3			c	2.5	1.1		
	3	b	2.8	1.4			e	2.9	1.7			d	2.8	1.2		
	4	d	3.2	1.2			d	3.1	1.2			b	3.4	1.1		
	5	a	3.6	1.4			a	3.7	1.3			a	4.1	1.3		

*Ltr - letter of items comprising each question

Table 34 (con't)

Ques-tion	Item Rank	Nature Center Leader Ltr	$\bar{x}$	SD	%	SD	All Ltr	$\bar{x}$	SD	%	SD
56	#1	a	2.6	2.1			a	2.8	2.3		
	2	b	3.0	1.7			b	3.4	2.0		
	3	c	3.5	1.6			c	4.4	2.3		
	4	h	3.9	2.0			h	4.5	2.2		
	5	d	4.5	1.6			d	4.5	1.8		
	6	e	4.6	1.8			e	4.7	2.0		
	7	g	6.6	1.5			g	6.0	1.8		
	8	f	7.3	1.4			f	6.2	2.2		
57	1	f	2.0	1.5	75	27.5	f	2.3	1.7	84	23.2
	2	d	2.2	1.1	52	25.3	d	2.4	1.4	64	27.6
	3	c	3.6	1.4	27	24.2	c	3.4	1.4	48	30.9
	4	a	3.7	1.5	32	23.5	a	3.7	1.6	46	28.6
	5	e	4.0	1.6	23	24.2	e	3.9	1.7	44	32.1
	6	b	4.5	1.5	21	25.8	b	4.5	1.5	31	31.0
58	1	e	1.9	1.2	59	24.1	e	2.1	1.3	63	22.7
	2	a	2.2	1.1	68	21.6	a	2.4	1.3	68	21.5
	3	f	3.0	1.2	51	25.1	f	3.0	1.3	57	24.3
	4	d	3.2	1.4	58	23.7	d	3.2	1.4	63	23.5
	5	b	4.6	1.1	79	22.9	b	4.5	1.3	73	25.1
	6	c	5.5	1.0	84	24.6	c	5.3	1.2	81	27.0
59	1	c	1.8	0.9			c	2.2	2.0		
	2	e	2.6	1.6			e	2.6	1.7		
	3	d	2.9	1.1			b	2.9	1.3		
	4	b	3.1	1.2			d	3.1	1.2		
	5	a	4.2	1.0			a	3.8	1.3		

Table 35

REMAINING COMPUTATIONS WILL BE BASED ON 3 DISCRIMINANT FUNCTION(S)

STANDARDIZED DISCRIMINANT FUNCTION COEFFICIENTS

	FUNC 1	FUNC 2	FUNC 3
Q1	-0.24036	-0.31299	-0.14855
Q4	-0.02836	-0.34096	-0.14447
Q5	-0.22530	-0.07137	0.07572
Q6	0.15935	-0.02372	-0.06697
Q8	-0.15633	0.08500	0.12645
Q9	-0.09368	-0.21481	-0.07156
Q10	0.06017	0.15477	-0.37160
Q11	0.03834	0.02607	-0.37710
Q12	0.12990	-0.18450	-0.01544
Q13	0.15612	-0.12414	0.19931
Q14	-0.11936	0.20703	-0.11511
Q17	0.23528	0.01128	-0.03710
Q18	0.00443	0.16009	-0.18342
Q20	0.08253	-0.15317	0.057[illegible]7
Q21	-0.03216	0.21562	-0.1444[illegible]
Q22	0.08282	-0.00027	-0.30542
Q23	-0.07616	-0.23635	0.05612
Q24	0.18837	-0.25164	-0.12745
Q25	0.25558	0.01146	-0.23534
Q27	-0.29457	0.10350	0.05848
Q28	0.10160	0.18744	-0.01752
Q29	0.10871	-0.07657	0.24174
Q31	-0.09439	-0.15425	0.03923
Q32	0.35659	-0.10372	0.09952
Q33	-0.24940	0.04597	0.21834
Q35	-0.00831	0.23336	-0.06217
Q36	0.01202	0.12555	0.23680
Q37	-0.12104	0.07395	-0.13800
Q39	-0.08298	0.02127	0.28005
Q41	0.03139	-0.15301	0.18595
Q42	0.10896	0.10009	0.25964
Q43	-0.11678	0.28087	0.06052
Q44	-0.06920	-0.24024	-0.11326
Q45	0.33177	0.05922	0.19422
Q47	-0.05105	0.22028	0.05967
Q48	-0.21628	-0.06581	0.10395

The Field Trip Milieu: Learning and behavior as a function of contextual events

The public school field trip remains a conspicuous part of the public school routine for most elementary school aged children. The annual trek to the zoo, museum, nature center or other such facility is about as predictable as the halloween parade and the end-of-school party. On most field trips, the students are put into busses early in the morning, driven to a rather novel setting, led through some activities by a stranger, put back on the bus and returned at the end of the day. In addition, they usually bring a bag lunch and some money to spend in the gift shop during periods of free time. In many cases, the majority of time is actually spent in transit rather than in direct participation in the lesson. However, it has never really been determined whether or how such extra-activity factors and disruption of the normal school routine affects behavior during trip activity, learning of the material presented during the activity, or retention of the field trip experiences.

Much research on field trips has focused on the evaluation of cognitive aspects of the experiences such as, do the participants learn the concepts presented (c.f. review by Koran and Baker, 1979). Other studies have focused on attitudes toward or appreciation of a specific subject matter (Bloomberg, 1929; Koran & Baker, 1979; Brady, 1972; Gottfried, 1979). In a series of studies, Falk, Martin and Balling (1978; Martin, Falk and Balling, Note 1; Balling and Falk, Note 2) attempted to investigate some of the environmental and psychological dimensions of field trips -- specifically the role of setting novelty in affecting cognitive learning. In these studies, previous experience with a setting was shown to positively influence concept learning, as it was hypothesized that totally novel settings placed preemptive demands upon the learner. Current psychological theory reenforces these notions about setting novelty. Extensive theoretical and empirical support has been provided by Helson (1964) in the development of his adaptation level theory. Berlyne (1960) has also shown that relative novelty has an effect on people's performance. Extensive animal research also exists which highlights the impact of novelty on behavior and learning (c.f. Falk, et al., 1978). Finally, another line of evidence suggesting that behavior will vary as a function of experience with the relevant stimulus materials comes from J.J. Gibson's perceptual learning theory (Gibson, 1966). E. Gibson (1969) reports a variety of studies in which mere exposure to a stimulus dimension enhances discrimination along that dimension. With increased familiarity, it becomes progressively easier to isolate individual elements in a complex array.

The study of incidental learning and selective attention has also suggested the importance of the environment in which a learning activity takes place. Children do learn a great deal about the setting or non-task relevant aspects (as defined by the teacher) of the total learning situation, such as the color of the flash cards, the place where their instructor dropped her books, or the price of a rubber gorilla at the zoo. More importantly, certain of these irrelevant stimuli may actually hinder task learning while others may facilitate it (Hale, Miller, and Stevenson, 1968; Maccoby, 1967; Maccoby and Hagen, 1965; Siegel and Stevenson, 1966; Trabasso and Bower, 1968). Thus, from this point of view, the study of the context for learning again emerges as an important endeavor. Finally, research on exploration (Hutt, 1970; Nunnally and Lemond, 1973; Weisler and McCall, 1976; Wright and Vlietstra, 1957) has shown that children investigate objects and environments differentially, depending upon their properties, and that young people learn quite a lot about their surroundings during self-initiated, non-directed activities. It should also be noted that the nature of the exploration depends upon the characteristics of the child, such as his developmental level and his familiarity with the setting (Endsley, 1967; Mendel, 1965; Nunnally and Lemond, 1973). Exploration research thus emerges as important in the present study in that, for most children on a field trip, a significant portion of their time is spend totally uninvolved in any structured learning activity. But what are they doing? What are they getting out of the whole experience? What do they retain? Will the novelty of a day away from school enhance learning or repress it relative to the same lesson taught outside on the school grounds?

There are at least two competing hypotheses concerning the outcome of this experiment. Both have to do with the relative amount of arousal generated by the events surrounding the outdoor learning activity. Children may learn and remember what happens on an all day field trip because it is such a novel, unusual event. It is clearly delineated from the day by day routine and hence the whole experience is more salient. Berlyne's work (1960, 1967) might support this notion, as it has shown that novel, clearly discriminable events are remembered quite easily. On the other hand, it could be that the excitement of the trip, the strangeness of the surroundings, and the novelty of the task demands may actually interfere with certain kinds of task-directed learning. By this hypothesis, the students would essentially be overloaded in terms of information processing demands and although they may learn many things, particularly about the setting, they may not be able to focus on the task (e.g. Falk, et al.,1978; Martin, et al., Note 1). The study represented here provides some preliminary data on how all day field trips do, in fact, affect elementary school students.

METHOD

Subjects - Subjects for this study were taken from the third and fifth grades in two suburban elementary schools in a large public school district in the mid-Atlantic area of the United States. Two classes at each grade level from each of the two schools were used. One third grade and fifth grade class from each school was randomly assigned to each experiemental manipulation. Classes were reasonably comparable socio-economically. A total of 98 fifth graders and 98 third graders, for a total sample size of 196, partcipated in the study.

Design and Procedures - There were two experimental groups. One went on an all-day field trip to a nature center to do a particular activity in outdoor biology. A chartered bus picked up the class in the morning and drove them to the facility. After a brief orientation session, they participated in a selected activity. These students then had a bag lunch on the lawn and were allowed a free period to further explore the area before being returned to the school at the end of the day. The other experimental group performed the same activity in a wooded area directly behind their school as part of their science lesson for the day. For this second group, the activity was intended to be minimally disruptive to the student's normal school day. After a brief introduction in the classroom, the students were taken outside for the activity. Transit time between the classroom and the wooded area was at no time greater than five mintues.

The activity was designed to investigate the interspecific differences between trees. Students worked as pairs, measuring trunk diameters, investigating leaf shapes and determining bark color and texture. After a data collection phase a group discussion was led to compare results and to: 1) assess which tree features were most effective for determining interspecific differences; and 2) arrive at a rough estimate of tree species diversity in the study area. Two trained leaders from the experimenters' staff led the activities at all sites. The duration of the activity ranged from 45-60 minutes. This particular activity had been successfully used previously in similar research by the authors (Balling and Falk, Note 2).

A number of different dependent measures were used to assess the impact of the experimental manipulation. In order to assess change in knowledge of the concepts to be learned in the activity, and in general information and attitudes the children possess about the setting where the activity was conducted, a pre-test, post-test measure was used. Most of this instrument was taken from a short written test with both multiple-choice and completion items that had been validated previously (Balling and Falk, Note 2).

The pre-test was administered to the students four weeks in advance of the field trip. The purpose for this procedure was to obtain pre-test data from all subjects while insuring that the subjects were not overly sensitized to the nature of the upcomiing field trip. Under these conditions, the pre-test should have had minimal impact on behavior during the trip. Parental permission was also obtained well in advance.

To assess the behavior during the activity, two trained observers were present for each group of subjects. The observers used an instrument developed specifically for assessing field trip behavior. A more detailed description of the instrument is included in Balling and Falk (Note 2). A sample of the instrument is included as an Appendix.

Measures of retention were also collected, each class was administered the post-test twice following the field trip. The first post-test given on the day after the trip, the second, one month later. In addition to the items included in the pre-test, the post-tests assessed memory for several other dimensions. Questions concerning the students' attitudes toward their participation in the outdoor activity and their perceptions of the leader were asked. A recognition memory test using slides was used to reveal memory for the specific activities in which they were engaged and for the specific setting in which they performed the activity. In this task, a series of slides were displayed for fifteen seconds each. Some of the slides pictured children doing an outdoor biology activity -- either the same activity as done by the subjects or a different, but related, activity. The slides also varied according to the setting in which the activity took place -- the nature setting, or the school setting. There were four categories of slides (same or different activity in each of two settings) and four examples of each category for a total of sixteen slides. Eight of these slides, two from each category, were shown on each occasion so that the second viewing was not testing recognition memory for specific slides. Students made two dichotomous judgments about each slide: 1) Does this slide show the same activity or a different activity from the one you did on your field trip? 2) Does this slide show the place where you did your field trip activity? Each post-test, including both the written portion and the slide presentation lasted approximately 20-25 minutes. All tests were conducted in the student's home classroom.

Results

Cognitive Learning Measures

Pre-test: A Sex by Grade, 2x2, analysis of variance was performed on the total scores on the pre-test. Not surprisingly, the fifth grade students tended to score higher than the third graders, as was revealed by a significant grade effect, $F(1,192)=3.97$, $p < .05$. No other effects were significant.

Post-test: There were two post-tests, one the day after the activity and one approximately 30 days later. On the first post-test, an analysis of covariance was performed, with Sex (2 levels), Grade (2 levels), and Location of the Activity (2 levels) as factors and the pre-test score as the covariate. The analysis of the adjusted post-test scores revealed a significant Grade X Location interaction, $F(1,187)=6.95$, $p < .01$. As can be seen in Table 1, the reason for this interaction was that whereas the third grade students performed at a higher level in the setting outside their schools, the fifth grade students showed superior performance in the nature center environment. The only other effect which was significant in these data was the Sex X Grade interaction, $F(1,187)=4.79$, $p < .05$, which resulted from the fact that whereas the fifth grade girls were superior to the fifth grade boys, there was no difference between the sexes in the third grade.

Analyses of the change scores between the pre-test and the first post-test revealed a significant overall increase in test scores, $t(195)=23.00$, $p < .001$. As suggested by the Grade X Location interaction, the relative amount of increase in scores varied from group to group, but the gain was highly significant in all cases [Third at School: $t(48)=10.31$, $p < .001$; Third at Nature Center: $t(48)=9.86$, $p < .001$; Fifth at School: $t(48)=12.47$, $p < .001$; Fifth at Nature Center: $t(48)=15.30$, $p < .001$). Thus, all groups showed a significant amount of immediate learning due to their participation in the experimental activity.

Analyses of covariance on the second post-test using both the pre-test and the first post-test as covariates revealed only one significant effect. The fifth grade girls who had done the activity at the Nature Center showed better retention than any other group of subjects; thus, the Sex X Grade X Location interaction was significant, $F(1,176)=6.24$, $p<.025$. However, all groups still scored significantly better than they had on the pre-test, $\underline{t}(184)=16.05$, $p<.001$, but there was also a significant decline from the performance level of the first post-test, $\underline{t}(185)=-7.18$, $p<.001$. In an analysis of variance on the unadjusted scores on the second post-test, the only significant effect that emerged was due to Grade, $F(1,117)=6.54$, $p<.01$. The third grade students still scored slightly lower than the fifth graders.

Affective Data: There were two attitudinal questions on the pre-test. The first asked where the students thought the best place was to learn about trees. They were given the following alternatives: a) park, b) greenhouse, c) forest, d) classroom, e) outside the school, f) home neighborhood. The majority of students (56.2%) selected the forest as the best place to learn about trees. The next most popular categories were greenhouse (13.4%) and the classroom (10.8%). A small number of responses were scattered across the other categories. When asked whether they would like to learn about trees as part of an all day field trip away from school or as a science activity outside their school, the overwhelming majority (82.0%) preferred the field trip. There were no significant differences between grades or sexes on the pre-test attitude items.

Three different attitudinal items were asked on the post-tests. One question asked how long the students thought they would remember what they had learned doing the activity, another probed how easily they thought they could recognize the place where they had done the activity, and the third asked how well they had liked the activity. On the first post-test, the fifth graders were more certain than the third grade students that they would remember what they had learned for a month or more (Fifth Grade: 86.7%; Third Grade: 65.6%; X^2 [1] = 5.89, $p < .025$). However, over time the third graders became more certain that they would remember what they learned, and by the delayed post-test both age groups showed approximately equal proportions responding that they would remember what they had learned for a month or more (Fifth Grade: 81.5%; Third Grade: 86.8%).

In general, two different trends emerged from the analysis of the post-test attitudinal question concerning the ability to remember the place where the activity was done. First, the students were less sure that they could easily recognize the nature center site than the location near their schools (Nature Center: 34.7%; Outside School: 49.5%). Second, when looking at just those subjects who came to the nature center for the activity, the fifth grade students, but not the third graders, became less certain over time that they could recognize the activity location ($X^2[3]=8.03$, $p < .05$).

On the final post-test item, the students in both age groups who had come to the nature center were much more likely to give the place where they had done the activity the highest positive rating than were the children who had done the activity outside their schools (Nature Center - highest positive rating: 66.5%; Outside School - highest positive rating: 50.0%). There was little change in these ratings from the first to the second post-test.

Slide Data: As part of the post-test, subjects viewed a series of 8 slides and made 2 judgments about each. Subjects had to determine whether the children depicted in the slide were doing the same activity they had done and, second, whether the place in the slide was the location where they had done the activity. For purposes of analysis, the slides were grouped into 4 categories:

a) same activity - same location, b) same activity - different location, c) different activity - same location, and d) different activity - different location. Subjects were given a "1" for a correct judgment and a "0" for an incorrect one. Since there were 2 slides in each category, scores ranged between "0" and "2" on each type of judgment.

A 2x2x2x2 analysis of variance was performed on these data with Grade and Activity Location as between-subject factors and with Activity Depicted in the slide and Location Depicted in the slide as within-subject factors. In the analysis of the activity judgments, several interesting facts emerged. First, subjects were overall more accurate in judging that the children seen in the slide were doing a different activity than they were in judging that they were doing the same activity, $F(1,192)=24.63$, $p < .001$). This effect was particularly pronounced for the third grade students as compared to the fifth graders, hence there was a significant Grade X Activity Depicted interaction, $F(1,192)=20.90$, $p < .001$). However, the dominant effect in the data was an interaction of the Activity Depicted in the slide with the Location Depicted in the slide, $F(1,192)=544.45$, $p < .001$). This interaction revealed that, when judging the activity in the slide, they were more likely to be correct when the activity and the location were concordant (i.e. same activity and same location or different activity and different location) than when these two attributes of the slides were discordant (i.e. same activity and different location or different activity and same location). Thus, the activity judgments were not independent of the background locations presented in the slides.

A similar pattern of results emerged in the analysis of the location judgment data. Students were generally more accurate in judging the site they had visited, than the one they had not [$F(1,192)=11.77$, $p < .001$]. Subjects were also more accurate in their location judgments when the activity depicted in the slide was different from the one they had done [$F(1,192)=82.97$, $p < .001$], which again showed the lack of independence between the activity and location judgments. Similar to the effect seen with the activity judgments, the subjects could more easily determine whether they had visited the location shown in the slide when the activity and location attributes were concordant than when they were discordant, $F(1,192)=88.83$, $p < .001$.

Behavioral Data: The behavioral scale used in this study is attached in the Appendix. Although only preliminary analyses of these data are available, the results are suggestive. In general, the subjects spent well over 90% o[illegible] time directly involved in the experimental activity. However, there [illegible] differences among the groups in certain non-task behaviors. For the third grade subjects, there was 75% more attending to the environment and to peers when they were at the nature center than when they were outside their schools. Third graders also showed almost twice as much exploration at the nature center as they did outside their schools. This pattern was completely reversed for the fifth grade subjects. The older students showed about 67% more attending to the setting and to peers when they were outside their schools than when they were at the nature center. Finally, the only exploration observed among the fifth grade students was outside their schools. Note that these simple behavioral data parallel performance on the cognitive measures.

Discussion

The results of both the cognitive and behavior measures reinforce the contention that the general milieu is an important dimension to consider in learning situations. However, the pre- to post-test results and the behavioral data show that the nature of the effect of location depends upon the developmental level of the students involved.

An analysis of the cognitive data shows a very significant pre- to post-test growth in learning for all groups. This knowledge persists over time, with some decrement, as evidenced by the fact that scores on the second post-test were still significantly higher than those on the pre-test, although they were also significantly lower than the scores on the first post-test. As post-test II was administered one month after the experience, these data could be viewed as strong support for the notion that single visit field trips promote cognitive learning. Of considerable interest was the significant grade by location interaction in the data. The school-based third graders showing greater gains than the nature center-visiting third graders, and the reverse being true for fifth graders, greater cognitive growth for those at the nature center. For reasons to be discussed shortly, the third garders apparently found the less disruptive shcool site lesson to be more conducive to learning, while the fifth graders found the day-long field trip to a nature center more educationally worthwhile.

The behavioral data are extremely interesting, particularly as they reenforce the cognitive data. The results show strong grade by location differences. The suite of behaviors that characterize the third graders at the nature center - disorderly, noisy, anxious, active and cautious, are the same descriptors used by the authors to describe children in a novel learning situation (Falk, et al, 1978; Martin, et al., Note 1). By contrast, the positive behaviors of the school site third graders (orderly, calm, quiet and interested) also characterizes the fifth graders on the nature center field trip. The fifth graders who participated in the hour-long activity behind their school are described as disorderly, noisy, active and very adventuresome. The descriptors are identical to the nature center third graders except for the cautious/adventuresome dimension. The behavioral data also show age by location differences in non-task behavior. In general, the greatest amount of non-task behavior of any group was exhibited by the fifth graders at the school (176 incidents), followed closely by the third graders at the nature center (144). The lowest incidence was the fifth graders at the nature center (103) and the third graders at their school (122). With this general grouping of non-task behaviors, the incidences of play, exploration, attending to setting and attending to peers follows the same general trend. In particular, the affiliation dimension of attending to peers sticks out for the third graders as predicted by the work of Martin, et al. (Note 1) for students in an uncomfortably novel situation.

The slide recognition results proved to be of interest as well, not so much for grade by location differences, but for the unanimity of the results. All groups showed success at remembering where they were and what they did, as evidenced by the scores on the same place, same activity and different place, different activity cells. The lack of success, in fact below chance in some cases, for the same - different combinations seems to suggest that the children were encoding the experience wholistically. They could not separate what they did from where they did it. As a consequence, they were very successful at discriminating when slides were presented where the activity and location were concordant, either positively or negatively, but if activity and location were confounded, they would, apparently, randomly select one of the cues and answer both activity and location questions as if they were the same. This suggests again that location is not a variable that should be ignored when assessing learning, since children are not ignoring it.

Perhaps the best way to integrate these data is to suggest a model (Figure 1) that shows task learning and non-task behaviors as inverse functions, both of which are influenced by novelty. Placing the four groups on this curve illustrates the interactions suggested by the cognitive and behavioral data. The fifth grade group which did the science activity outside of their classroom, behind the school, would be at roughly point A on the figure - they exhibited the highest level of non-task behaviors and a relatively low level of task learning. It can be assumed that they found the site only marginally novel, they were generally very rambunctious. The other fifth grade group, attending an all-day nature center field trip, would be at roughly point B. This group found the setting "optimally" novel with a resulting high level of cognitive task learning. Also, with a high level of task learning, but farther out on the novelty dimension would be the third graders at the school, point C. Finally, at point D, very far along the novelty dimension, are the third graders who took a field trip to a nature center. They are beginning to show a "novel field trip effect" with high levels of affiliation and non-task exploration resulting in task learning decrement. At the lowest levels of novelty, play behavior occurs in order to stimulate necessary arousal levels (Berlyne, 1960, 1967), and at high levels of novelty, environmental exploration assumes maximal importance (Falk, et al 1978; Martin, et al., Note 1). Developmental level (i.e. experience) proves to be important for accurately placing groups in this model. At different ages, an identical experience can have dramatically different consequences as evidenced by the third and fifth graders in this study.

Of general interest to note is that for all groups, cognitive learning occurred and although there was some decline over time, scores remained very significantly above base-line levels. Also interesting is that all groups were highly positive, pre- and post-experience, about the field trip/outdoor learning experience. Field trips are generally perceived as positive by students, and the data support the notion that learning does occur, although, of course, influenced by environmental factors. Of particular note is that certain classic behaviors such as interest and attentiveness are not sufficiently sensitive to discriminate levels of learning, but that other behaviors such as gross motor activity, noisiness or relative anxiety, may be good predictors. Using the model in Figure 1, teachers should strive to take students on field trips which provide moderate amounts of novelty. At early ages, short forays from the classroom may most efficiently accomplish this objective, but as students gain experience, more elaborate and longer trips are required. At least for the fifth grade students in this study, a full day's field trip was an extremely educationally worthwhile activity - far more so than the short trip behind the school; the opposite was true for the third grade students.

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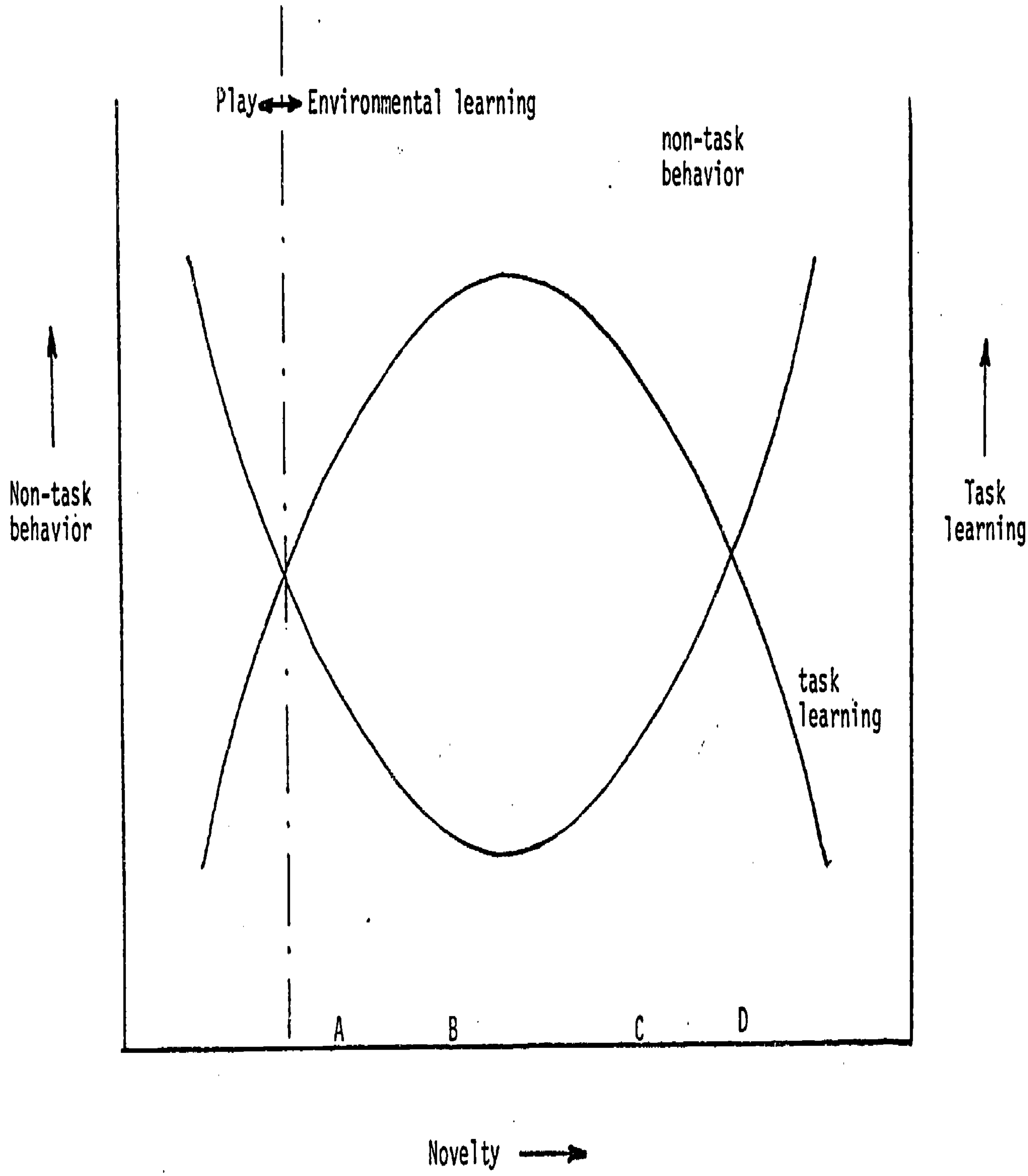
TABLE 1

	Pre-Test	Post-Test 1	Post-Test 2
Third Grade			
School	15.3	21.9	20.0
Nature Center	14.9	20.6	19.2
Fifth Grade			
School	16.7	22.3	21.3
Nature Center	16.1	23.7	21.4

Mean test scores for each grade at each activity location.

Figure 1. A model depicting the interaction of task learning and task-relevant behaviors as a function of setting novelty.



85

93

94

APPENDIX

I. Background Information

Sex: F M Age ______________

Title of present position: ______________________________

Years in this position: ______________________________

Other education related positions/experience: ______________________________

____

Total number of years in these positions: ______________

Degrees held (circle highest):

a) high school diploma

b) college degree

c) master's degree

d) doctorate

e) other: ______________________

Age range of students with which you work (if appropriate): ______________

State or Province in which you reside: ______________________________

Q

II. For items 1 through 48, please rate each statement using the following scale:

+3	+2	+1
strong support or agreement	moderate support or agreement	slight support or agreement
-1	-2	-3
slight opposition or disagreement	moderate opposition or disagreement	strong opposition or disagreement

Please respond to every statement, even if you do not feel strongly about all of them.

1. The most important consideration when selecting a site for a science field trip is whether planned educational programs are available. +3 +2 +1 -1 -2 -3

2. Areas near the school are good for science activities or field trips because the students tend to be familiar with them. +3 +2 +1 -1 -2 -3

3. Science field trips contribute to the quality of the education of participating students. +3 +2 +1 -1 -2 -3

4. Students enjoy particular topics in science more when they go on subject-related field trips. +3 +2 +1 -1 -2 -3

5. Science field trips are not worth the trouble it takes to prepare for them. +3 +2 +1 -1 -2 -3

6. Field trips provide the teacher with a sense of relief due to a break in the routine. +3 +2 +1 -1 -2 -3

7. Students tend to be better behaved in the classroom for the day following a field trip. +3 +2 +1 -1 -2 -3

8. The characteristics of the place where students go on a field trip is the major determinant of student behavior on that field trip, for example the characteristics of a zoo versus those of a hospital. +3 +2 +1 -1 -2 -3

9. Science field trips capitalize on the student's natural curiosity. +3 +2 +1 -1 -2 -3

10. Areas near the school, such as lawns, playgrounds or nearby parks, have resources that can help students understand classroom lessons in science. +3 +2 +1 -1 -2 -3

11. Field trips are more fun for students if they get to ride somewhere on a bus. +3 +2 +1 -1 -2 -3

12. Students pay better attention on a field trip when they have an unfamiliar person for a leader (e.g. a naturalist or a docent). +3 +2 +1 -1 -2 -3

13.	The main reason field trips are attractive to students is that they get out of the classroom.	+3	+2	+1	-1	-2	-3
14.	Museums have materials and exhibits that can help students understand classroom lessons.	+3	+2	+1	-1	-2	-3
15.	It is more difficult to control a group of students in a novel environment than in a familiar setting.	+3	+2	+1	-1	-2	-3
16.	Field trip experiences tend to improve the relationship among the participating students.	+3	+2	+1	-1	-2	-3
17.	Some children do not like outdoor science activities because they perceive the places where they do them as somewhat fear or anxiety provoking.	+3	+2	+1	-1	-2	-3
18.	It is generally difficult for students to relate field trip experiences to their classroom lessons.	+3	+2	+1	-1	-2	-3
19.	An important reason for doing outdoor science activities is that they provide an opportunity for students to experience many real examples of what they are trying to learn.	+3	+2	+1	-1	-2	-3
20.	Science field trips are valuable because they provide an opportunity to get the students out of the classroom.	+3	+2	+1	-1	-2	-3
21.	The better students benefit more from science field trips then poorer students.	+3	+2	+1	-1	-2	-3
22.	The most important determinant of student behavior on a field trip is the quality of the leader.	+3	+2	+1	-1	-2	-3
23.	Field trips help increase the teacher's knowledge of subject matter relevant to the field trip.	+3	+2	+1	-1	-2	-3
24.	Nature centers have resources that can help students understand classroom lessons in science.	+3	+2	+1	-1	-2	-3
25.	Students pay better attention on a field trip if they think they will be tested afterward.	+3	+2	+1	-1	-2	-3
26.	Field trips help teachers maintain their enthusiasm for science topics.	+3	+2	+1	-1	-2	-3
27.	The most important determinant of student behavior on a field trip is the degree of interest in the subject matter.	+3	+2	+1	-1	-2	-3
28.	The long bus rides necessary for many field trips tend to affect the students negatively.	+3	+2	+1	-1	-2	-3

29. It is very important for students to have fun on a science field trip. +3 +2 +1 -1 -2 -3

30. The best outdoor science activities do <u>not</u> take too much time away from other subjects and classes. +3 +2 +1 -1 -2 -3

31. Many students perceive outdoor science activities simply as "fun time". +3 +2 +1 -1 -2 -3

32. As a general rule, returning to the same site for a field trip, both within and across several school years, is a good idea. +3 +2 +1 -1 -2 -3

33. Students enjoy outdoor science activities because they get a chance to interact with their friends. +3 +2 +1 -1 -2 -3

34. Field trip experiences tend to keep the students more involved in the classroom science curriculum. +3 +2 +1 -1 -2 -3

35. Areas near the school are good for science activities or field trips because they can be used without taking up the whole school day. +3 +2 +1 -1 -2 -3

36. Field trip activities can really help students learn science. +3 +2 +1 -1 -2 -3

37. The same kinds of learning take place in a science classroom and on a science field trip. +3 +2 +1 -1 -2 -3

38. Outdoor science activities help students see how their classroom learning can be used in the real world. +3 +2 +1 -1 -2 -3

39. Because areas near the school are accessible, they are good to use for outdoor science activities or field trips. +3 +2 +1 -1 -2 -3

40. Nothing is really learned on science field trips. +3 +2 +1 -1 -2 -3

41. Students tend to be less well behaved in the classroom for the day following a field trip. +3 +2 +1 -1 -2 -3

42. Many students do not pay attention to the activity or instructor on outdoor science field trips. +3 +2 +1 -1 -2 -3

43. Field trips help teachers establish greater rapport with their students. +3 +2 +1 -1 -2 -3

44. Behavior in the classroom is often disrupted in anticipation of a field trip. +3 +2 +1 -1 -2 -3

45. The excitement a student feels is the major determinant of behavior on a field trip. +3 +2 +1 -1 -2 -3

46. Field trips contribute to students developing a negative attitude toward science. +3 +2 +1 -1 -2 -3

47. The setting or location in which teaching/learning occurs affects the outcome of learning. +3 +2 +1 -1 -2 -3

48. Students can learn more science in the classroom than they can by spending the same amount of time doing an outdoor science activity. +3 +2 +1 -1 -2 -3

III. For questions 49 to 51, please rate each lettered item as indicated.

49. In preparation for a field trip, classroom teachers might do some of the following things. Rate each according to: 1) how important is it to the success of the trip (+3 = very important; +2 = important; +1 = somewhat important; -1 = somewhat unimportant; -2 = unimportant; -3 = very unimportant); and 2) what percentage of the time is each of these things done.

		What percentage of the time is this done?				
		near 0	25	50	75	near 100
a) make a previsit to the site	+3, +2, +1, -1, -2, -3	0	25	50	75	100
b) obtain a lesson plan from the individual who will be leading the tour	+3, +2, +1, -1, -2, -3,	0	25	50	75	100
c) familiarize themselves with the goals and objectives of the institution the class will be visiting	+3, +2, +1, -1, -2, -3	0	25	50	75	100
d) brush up on the general subject area to be covered on the trip	+3, +2, +1, -1, -2, -3	0	25	50	75	100
e) develop their own lesson plan	+3, +2, +1, -1, -2, -3	0	25	50	75	100
f) other ______________	+3, +2, +1, -1, -2, -3	0	25	50	75	100

50. The following is a list of things museums or nature centers could do in preparation for school group visits. Rate each in terms of its importance to a successful field trip. (+3 = very important; +2 = important; +1 = somewhat important; -1 = somewhat unimportant; -2 = unimportant; -3 = very unimportant).

a) development specific activities	+3	+2	+1	-1	-2	-3
b) provide trained leaders	+3	+2	+1	-1	-2	-3
c) work with each teacher to develop an activity	+3	+2	+1	-1	-2	-3
d) provide a pre-trip orientation to the class	+3	+2	+1	-1	-2	-3
e) provide an on-site pre-trip orientation to the teacher	+3	+2	+1	-1	-2	-3
f) other ______________	+3	+2	+1	-1	-2	-3

51. The following is a list of items students may remember following a science field trip. Rate each in terms of how well you think students will remember them. (+3 - remember completely . . . -3 - forget completely).

a) activities actually done (e.g. using a seine net, playing mathematical games, or viewing exhibits)	+3	+2	+1	-1	-2	-3
b) aspects of the physical setting (e.g. bugs, a cliff, a domed ceiling in a museum)	[illegible]	+2	+1	-1	-2	-3
c) bus ride	[illegible]	+2	+1	-1	-2	-3
d) events surrounding lunch and other free time	[illegible]	[illegible]	+1	-1	-2	-3
e) gift shop or store	[illegible]	[illegible]	+1	-1	-2	-3
f) leader	+3	+2	+1	-1	-2	-3
g) social or interpersonal events	+3	+2	+1	-1	-2	-3
h) subject matter and concepts presented	+3	+2	+1	-1	-2	-3
i) unplanned incidents (e.g. accidents or mishaps)	+3	+2	+1	-1	-2	-3

IV. Items 52 to 55 are multiple choice. Please circle the one best answer for each question.

52. Who tends to get the most out of field trips?

a) girls
b) boys
c) both sexes equally

53. (a) From a pedagogical point of view, the optimal frequency for out-of-classroom science experiences is:

a) never
b) once a year
c) two to six times a year
d) once a month
e) several times a month
f) once a week or more

(b) If applicable, how often does or did your class do out-of-classroom activities?

a) never
b) once a year
c) two to six times a year
d) once a month
e) several times a month
f) once a week or more

54. What is the optimal role for the classroom teacher on a science field trip?

a) leader
b) co-leader with a trained expert
c) disciplinarian
d) interested participant
e) other specify: ______________________________

55(a) Ideally, who should assume the major responsibility for organizing field trips?

a) teacher
b) teacher's aide
c) parents
d) principal
e) students

(b) If applicable, who actually assumes this responsibility in your school?

a) teacher
b) teacher's aide
c) parents
d) principal
e) students

V. For items 56 to 59, please rank order the lists of items based on the scales specified in each question.

56. Rank order the following list of impediments to classes going on more science field trips with "1" being the greatest impediment and "8" being the smallest impediment.

	Rank
a) cost of transportation	____
b) general inertia on the part of the teacher	____
c) lack of administrative support for field trip	____
d) lack of appropriate teacher training	____
e) lack of curriculum flexibility	____
f) absence of worthwhile places to go	____
g) students cannot deal with the field trip situation effectively	____
h) teachers feel insecure about taking science field trips	____

Are there any other impediments to taking field trips you would like to mention? ______________________________

57. Rank order the following list of preparations that students should do or should receive prior to a field trip in terms of their importance to learning. Let "1" be the most important preparation and "6" the least important. Then, rate each in terms of the percentage of students who actually do or receive them.

	Rank	Percent students near 0				near 100
a) do some background reading	____	0	25	50	75	100
b) view a slide orientation	____	0	25	50	75	100
c) practice any skills that will be necessary for the trip activity	____	0	25	50	75	100
d) study trip relevant material as part of the regular curriculum	____	0	25	50	75	100
e) be assigned a specific responsibility for the trip	____	0	25	50	75	100
f) be told where they are going and what to expect	____	0	25	50	75	100

Are there any other preparations for science field trips that you would like to mention? ______________________________

58. Rank order the following possible benefits of science field trips in terms of importance with "1" being the highest and "6" the lowest. Then rate each benefit in terms of the percentage of students you think actually acquire these benefits.

	Rank	Percent students near 0				near 100
a) increased subject matter knowledge	____	0	25	50	75	100
b) an opportunity to visit a new place	____	0	25	50	75	100
c) a break from the daily routine	____	0	25	50	75	100
d) an opportunity for cooperative learning	____	0	25	50	75	100
e) development of a more positive attitude toward science	____	0	25	50	75	100
f) learning of new skills	____	0	25	50	75	100

Are there any other benefits of scientific field trips that you would like to mention? ______________________________

59. The following is a list of places where teachers could take their students for out-of-classroom science activities. Rank them according to the frequency with which you use (or recommends using) each location. (1 = Most frequent; 2 = Next Most Frequent . . .; 5 = Least Frequent)

Place	Rank
local businesses or industries	____
museums	____
nature centers or parks with nature programs	____
local parks	____
school yard	____

60. Do you have any additional comments about field trips or out-of-classroom science activities that you would like to share with us?

61. Do you have any reactions to this questionnaire that you would like to share with us?

THANK YOU FOR YOUR COOPERATION

VI. Optional Information - We would appreciate it if you would please provide the following information. All replies will be kept strictly confidential.

Name: ______________________________

Address of place of employment:

____

____

____

____

ACTION

(21) Do/Manipulate
(22) Attend to (watch, listen)
(23) Play with
(24) Explore
(25) Communicate
(26) Disciplined/Focused
(27) Walking between locations
(28) Resting/Waiting
(31) Undetermined

OBJECT

(51) Activity/Activity Objects
(52) Setting/Setting Objects
(53) Search for lost item
(61) Task relevent discussion
(62) Task irrelevent discussion
(63) Positive Comment
(64) Negative Comment
(65) Instruction/Instructive Comment
(66) Request information
(70) Within pair interaction
(71) Peers
(72) Teacher
(81) Undetermined

****

	STUDENT A	STUDENT B
Sex		
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		