EFFECTIVENESS OF STRUCTURED AND UNSTRUCTURED FIELD TRIP: AN EXPERIMENTAL STUDY

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Field trips are an opportunity for an enriching, educational, entertaining, and hands-on experience for children in the 'real world.' Field trips provide an opportunity for students to learn key skills which are tough to impart in a school environment. It provides first hand experiences with meaningful transfer of learning. Schools organise field trips. Schools should ensure maximum learning of students by the field trips. But question arises how? Will it be possible if the students are let free to visit the places? In this respect the present study was an attempt by the investigators to study the effectiveness of structured and unstructured field trips to explore the displays in the fun with science gallery of National Science Centre, Delhi. Effectiveness of structured and unstructured field trip was seen in terms of mean gain scores of students. Study indicates that structured field trip significantly enhanced mean gain scores of students who were in the experimental group.

Introduction

The limitless resources of the community give ample opportunities for introspection and study. Educational field trips fulfil such purpose of content enrichment. It also provides opportunities for breaking monotony of classroom setting, and also designed to provide complete sensory experience with things and phenomena which cannot be brought into the classroom. It involves taking students to places where the subject matter may be studied in a natural setting. NCF (2005) proposes that (i) knowledge should be connected to life outside school, (ii) learning should be shifted away from rote methods, and (iii) curriculum should be enriched so that it goes beyond textbooks. NCF (2005) further recommends that teaching should aim at enhancing children's natural desire and strategies to learn. Field trips expand children's learning through active hands-on experience with the rich resources of the local community. Field trips increase student's knowledge and understanding of a subject and add realism to the topic of study. Teachers use field trips as part of their pedagogy because they feel that their students need hands-on, real life experiences or to examine applications of science which augment their classroom studies (Michie Michael 1998).Well-planned field trips provide participants with first-hand experience related to the topic or concept being discussed in the programme. They provide unique opportunities for learning that are not available within the four walls of a classroom. (Brian Myers and Linda Jones 2004). Educational field trips help to give a practical approach

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for the curriculum and it is helpful to develop more interest in learning among students (Shakil Fatima, Anila; *et.al* 2011). Sorrentino and Bell (1970) reviewed texts and research articles by science educators, summarising their reasons for taking field trips into five attributed values: providing first-hand experience, stimulating interest and motivation in science, giving meaning to learning and interrelationships, observation and perception skills, and personal (social) development. Quantitative studies of the attitudes of teachers towards field trips were undertaken by Falk and Balling (1979), Fido and Gayford (1982) and Muse, Chiarelott and Davidman (1982). The researchers found that, in the opinion of teachers, the positive benefits derived from field trips were:

- Hands-on, real world experiences.
- Quality of education, positive attitudes to science and motivation towards the subject.
- Improvement of the socialisation between students, which would impinge on the classroom, and development of rapport between teachers and students enabling teachers to utilise other learning strategies such as cooperative learning.

Rationale of the Study

An educational well-planned field trip can be a valuable tool and should be an integral part of the instructional programme. Quality field trips must run smoothly in terms of planning and logistics (*Storksdieck, M., Robbins, D., Kreisman, S.2007*). Good field trips provide participants with first-hand experience related to the topic or concept being discussed in the programme. A good field trip should also have the effect of stimulating further study. The students not only observe the situation while they are there, but are encouraged to think further about what they have seen. Many teachers work hard to develop "post-classroom carry over." The field trip has this ingredient built into it from the start. There is also an element of personal involvement in the field trip, particularly if the teacher has been wise enough to allow the students to participate actively in the planning of the trip. Good planning must precede field trips. Careful attention should be given to trip selection, pre visit preparation, the trip itself, appropriate follow up, and evaluation. Children need both preparation and follow up to get most out of a field visit (Brooke, *et.al*., 1996).

In India lot of researches have been conducted on evaluation and effectiveness of museums, i.e., visitors' response towards exhibits in museums *(*Nair *1993)*, creation of scientific temper among school children *(*Singh, *D.P. 1985)*. Khatter *(1988)* developed museum by collecting specimens through survey. Gujarati *(1994)* evaluated the potential of museum as institution that could complement and supplement school education. There are very few studies in India which have experimentally studied the contribution of National Science Centre and Museum at secondary and lower primary levels. Javelekar, V.D. *(1988)* found that participatory museum displays helped in conveying scientific concepts more effectively than the other method at secondary level and Sangeeta *(1999)* found

that pupils taught through museum based teaching strategy have higher achievement level at lower primary stage.

In Delhi schools under Directorate of Education organise local and outside field trips to various places. Guidelines are also issued to the schools by the authorities regarding the scheme under which tour is to be organised, list of agencies, site for local tour, standard menu for breakfast and lunch, type of transport, etc. Schools should ensure that the experience gained by the students during the field trips must give relevance and meaning to their knowledge but a question arises how to ensure maximum learning from this? Whether it is to be carried out by structuring the visit or it should be unstructured to ensure maximum learning. This study was the experimental investigation of contribution of structured and unstructured field trips to National Science Centre, Delhi in terms of academic achievement of students at upper primary level. So, keeping in view, the above rationale, the present study was conducted by the investigators to study the effectiveness of structured and unstructured field trips through experimental design.

The following title was stated:

"Effectiveness of Structured and Unstructured Field Trips:" An Experimental Study

Objective

The study was taken up with the following objective.

- To study the effectiveness of structured and unstructured field trip to National Science Centre, Delhi in terms of academic achievement of students.

Hypothesis

There is no significant difference between the post-test mean scores of students who experienced structured and unstructured field trip to National Science Centre.

The study was designed to test the following null hypothesis:

Methodology

For the collection of data, survey, two groups, randomised post-test design were used.

The basic design used in the study is two groups, randomised subjects post-test only. Two groups were formed as experimental and control group through random selection to increase the internal validity of the results. Independent variable is the treatment variable i.e. structured and unstructured visit. Dependent variable is the criterion test or post-test, (Y1 and Y2). Both the groups were subjected to pre-test to equate the pre experimental status of the groups as well as to measure the previous knowledge of the subject matter. According to Best, Johan

Table 1: Research Design

S. N.	Randomly Assigned	Independent Variable	Post-test
1.	Experimental Group	Structured Field Trip	Y_1
2.	Control Group	Unstructured Field Trip	Y_2

W. and Kahn, James V. (1995) analysis of covariance is a method of analysis to equate the pre experimental status of the group which may be determined by pre-test scores in a pre-test-post-test study, or in post-test only studies, by such measures as IQ, reading scores, or previous knowledge of subject matter. In the present research both the groups were measured on the dependent variable. The final mean post test scores of each group on the dependent variable were adjusted for pre-test differences by covariance analysis. The adjusted final means were then compared to determine if differences were statistically significant.

Sample

There were two types of samples as per the objective of the study.

(i) Students Sample

Government Co-Ed. Senior Secondary School, Najafgarh with English as medium of instruction was selected purposefully because this school was having four sections of English medium with 221 students. From the 221 students, using systematic sampling, 60 students were selected.

(ii) Participatory Displays

There were 87 participatory displays in the "fun with science" gallery of National Science Centre, Delhi. Only 20 exhibits were selected purposefully from the 87 other exhibits of the gallery using checklist as a tool. These 20 exhibits so selected were based on the contents and activities which were present in the NCERT science textbooks of Classes VI to VIII. This gallery was purposefully selected for the study from the other galleries because the exhibits present in the gallery were more interactive and participatory in nature. Table 2 shows the selected displays and name of chapters with classes.

Table 2: Displays and Names of Chapters with Classes

S. N.	Name of the Display	Chapter	Class
1.	Magnetic lines of force	13	VI
2.	Magnetic repulsion	13	VI
3.	Pull against magnet	14	VII
4.	Magnetic field	13	VI
5.	Wave motion	13	VIII
6.	Fun mirrors	11,15	VI, VII
7.	Iris	16	VIII
8.	Is light visible?	16	VIII

9.	Kaleidoscope	16	VIII
10.	True mirror	16	VIII
11.	See your back	16	VIII
12.	See your side	16	VIII
13.	Head on a platter	11	VI
14.	World of symmetry	16	VIII
15.	Phases of moon	17	VIII
16.	Where do you feel comfort?	11	VIII
17.	Pipes of pan	13	VIII
18.	Xylophone + Organ pipe	13	VIII
19.	Impossible mixture	04	VI
20.	Colour Shadows	15	VII

Tools Used

1. A survey was conducted in the fun with science gallery using three checklists (Classes VI to VIII) developed by the investigators having all the names of the exhibits; i.e., 87 and name of the chapters present in the science textbooks of Classes VI to VIII followed by checking each exhibit with the contents and each activities present in the chapters of textbooks.
2. Pre-tests and post-tests were developed by the investigators. Pre and post-tests were based on the 20 displays which were selected as sample from the "fun with science" gallery. In pre-test there were 20 multiple choice questions with four alternatives of 20 minutes duration with 20 marks. Structured post-test had the names of the displays followed by the questions. There were 40 items multiple choice questions with four alternatives of two hours duration with 40 marks. Investigators also developed structured activity sheet for experimental group having the names of the displays and the instructions to be followed display-wise like, name of the display, draw diagram of the display, working of display, description of concepts written on the concept box attached to it.

Procedure of Data Collection

Sixty Class VIII students were given pre-test at the school before going to visit the National Science Centre. Pre-test was used here to know the initial status of the students (Previous knowledge of the subject based on the contents of Classes VI, VII, and VIII science textbooks and also related with the twenty displays in the "fun with science" gallery).

After this test, the students were divided into two groups by using systematic sampling technique. By flipping a coin one group was assigned as experimental group and another as control group. Structured treatment was given to the experimental group students by giving them prior information and clues regarding what to look for during their visit with activity sheet. Whereas the control group students were not given any prior information and clues regarding what to look for, during their visit. Then students were taken to the National Science Centre, Delhi. Experimental group students were taken directly into the 'fun with science' gallery having structured activity sheet. They were given two hours to complete the task and facilitated to explore, observe and interact with the displays which were already mentioned in their activity sheet. Students enjoyed and interacted with the displays and completed their task within the stipulated time. Control Group students were also sent along with the teachers of the school to visit the galleries of the centre. Control group students also visited 'fun with science' gallery with other galleries, but in the unstructured conditions, i.e. with respect to time and without any structured activity sheet. Control group students visited this gallery as they visited other galleries. After the treatment, students of both the groups were given the post-test of 40 marks of two hours duration in the seminar room of the centre. After the collection of data, scoring of the responses of students was done. In pre-test, one mark was awarded for the correct option selected by the students. In post-test there were 40 questions carrying one mark and each correct response was awarded one mark.

Statistical Treatment

Raw scores obtained from the pre-test and post-test were treated with descriptive and inferential analyses like mean, S.D, t' test, F' test, ANCOVA respectively for the analysis of the data.

Result

Investigators used randomised two groups post-test design for the study. Research hypothesis stated in null form was: There is no significant difference between the post-test mean scores of students who experienced structured and unstructured field trip to National Science Centre.

Pre-test and post-test scores of experimental and control group were analysed through the use of analysis of covariance in which pre- test scores of students were taken as covariate. 't' values were computed between the adjusted means of experimental and control group.

Table 3: Analysis of Variance of Pre-test and Post-test Scores

S. N.	Sources of Variation	Df	SSx	SSy	M.Sx (Vx)	M.Sy (Vy)	Fx
1.	**Among Means of Groups**	1	3	350	3	350	0.60
2.	Within Groups	58	291	937	5.02	16.16	
	Total	59	294	1287			

(f at 0.05 level = 4.00; 0.01 level = 7.08)

Fx = 0.60 in the Table 3 shows that investigators were quite successful to get random sample in groups, e.g. Experimental and Control Group. It means both the groups were equal before the treatment on initial scores, i.e., pre-test. While the value of Fy =21.65 shows that both the groups differed significantly at 0.01 level.

Table 4: Analysis of Covariance Post-test Scores

S. N.	Sources of Variation	Df	SSy	Vy.x	Fy.x	S.Dy.x
1.	Among Means of Groups	1	350	233		3.96
2.	Within Groups	57	937	15.68	14.86	
	Total	58	1287			

(f at 0.05 level = 4.00 ; 0.01 level = 7.08)

From Table 4 it was found that Fy value of 21.65 has decreased after the adjustment in the among and within variances through the use of ANCOVA to Fy.x to 14.86. Both the values are highly significant at 0.01 levels.

Table 5: Adjusted Post-test Means of Experimental and Control groups and 't' Value

S.N.	Group	No. of Students	Mean Pre-test	Mean Post-test	Adjusted Mean Post-test	't' Value
1.	Experimental	30	8.56	16.66	16.72	4.73
2.	Control	30	9.00	11.83	11.89	

(N=60, df 58) ('t' value at 0.05 level = 2.00; 0.01 level = 2.66)

Table 5 reveals that calculated' value of 4.73 is greater than the table value of 2.00 and 2.66 at 0.05 and 0.01 levels respectively. It is clear that adjusted mean post–test score of experimental group is significantly higher than mean post-test score of control group. Hence, the null hypothesis is rejected. This shows that structured field trip significantly enhances academic achievement of students.

Discussion

Present study indicates that structured field trips significantly enhance the mean gain scores of students than the unstructured field trips. Numerous research studies in science education have documented significant gain in participant's factual knowledge and conceptual understanding after participation in well-planned field trips. Finding of this study more or less corroborates with that of the following research studies. Javelekar,

V.D (1988) found that participatory museum displays helped in conveying scientific concepts more effectively than the other method. Canizales de Andrade (1989) indicated that students who experienced structured visits scored significantly higher on academic achievement test than those who experienced non-structured visits. *Paris, et.al.* (1993) pointed out that field trips to museums can enrich education, though teachers and parents must guide children's explorations and help them connect their previously gained knowledge with new information from the exhibits. Brooke, et.al, (1996) concludes that, to get the most out of a visit to a hands-on science centre, children need both preparation and follow up. Sangeeta (1999) reported that preparatory stage, museum visits and follow up programmes should be carried out for effective learning. The study also found that pupils taught through museum based teaching strategy have higher achievement level. Storksdieck, M., Robbins, D., Kreisman, S. (2007) have shown that there should be links between the field trip content and the school curriculum; and quality field trips must run smoothly in terms of planning and logistics. A field trip should be designed in such a way that participants can easily make connections between the focus of the field trip and the concepts they are learning in the rest of the educational programme.

Educational Implication

Structured field trips enhance learning of students. While structuring a field trip, three important stages should be included: pre-trip, trip, and post-trip.

Pre-trip Stage

The pre-trip stage of a field trip involves two major components: administration and instruction. The administration component involves all of the steps taken by the field trip organiser to arrange the logistics of the field trip. The instruction component of the pre-trip stage is critical in preparing participants for the experience. To increase the educational effectiveness of field trips, it is important for field trip organisers to give participants prior information and clues regarding what to look for during their activities (structured activity sheet).

Trip Stage

Two components should be addressed during this stage: the role of the participant and the role of the organiser. Working in pre-assigned groups of two to three, participants can complete an activity using an activity sheet. The activity sheet should clearly relate to the educational goals of the field trip. During field trips, organisers should function more as facilitators or guides rather than directors.

Post-trip Stage

This stage also contains two components: debriefing and a culminating activity. During the debriefing session, participants should be encouraged to share and discuss their experiences during the field trip. The second component of the post-trip stage is a culminating activity. This activity should give participants an opportunity to apply the content knowledge they gained during the field trip. Follow up work which may be given to students as part of formative assessment are projects, Hindi or English language activities, such as, writing a report on the visit, role-play activity, writing a poem or story. Assignments like model/ working exhibit, sketch, etc., can also be given to students to relate it with their content.

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