FIELD STUDIES IN THE NEWFOUNDLAND INTERMEDIATE AND SECONDARY SCIENCE CURRICULUM

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Title of Thesis

Field Studies in the Newfoundland Intermediate and Secondary Science Curriculum

by

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Abstract

The purpose of this research was to assess the use of outdoor resources in the teaching of Intermediate and Secondary Science in Newfoundland Schools, and to ascertain what impediments exist to its use, as well as to obtain suggestions from Science Teachers to facilitate and improve the use of the outdoor classroom in their science teaching. A set of 13 research questions were used to guide the development of the survey/questionnaire in the study. All the school boards in the province of Newfoundland were contacted in order to obtain a list of all intermediate and secondary science teachers within their school districts. A list of 465 teachers was compiled. Each teacher on this list was mailed a survey/questionnaire. A total of 256, or 55% were returned. This data was then analyzed and general conclusions and recommendations made. It was found that the majority of field trips in the intermediate grades were completed in the grade seven program. In the secondary school science program the majority of field trips were taken in the area of environmental science. There was a large percentage of teachers in the biology, earth science, and geology areas who never take field trips. The most important factor seen by teachers as limiting or restricting the use of field trips in teaching science was financing the travel. Other important factors included: lack of funding for resource material, length of classtime, class scheduling problems, too rigid curriculum requirements for courses, lack of resource material, classes too large, and few local sites of interest. The most important factor which can contribute to improving and increasing the use

of field trips in science teaching is inservice and workshops for science teachers on how to effectively design field trips. Other factors seen as important in improving or increasing the use of field trips in science were: special regional materials designed for your particular area, inform non-science teachers and administrators of the benefits of using the outdoors, and more preparation for field trips in university undergraduate classes. Less than 25% of the teachers listed university programs as their main preparation for conducting science activities involving the use of field trips. The majority indicated that they were self-taught in the use of field trips in the science curriculum. Most field trips take place on or near the school grounds and 51.2% take place within walking distance from the school. Most field trips are carried out during one or two class periods. Respondents were positive about the importance and necessity of using field trips as classroom and laboratory aids in teaching science. Most activities conducted by teachers in the field were concerned with environmental quality and pollution. The most frequently visited sites for field activities were marshes and bog land, forest, pond or lake, and stream or river.

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CHAPTER ONE

Introducing the Research

Go my sons, burn your books,
buy yourself stout shoes.
Get away to the mountains, the deserts
and the deepest recesses of the earth,
in this way and no other
will you gain true knowledge of things
and their properties!

Peter Severinus, 1571

Science Education, since the 1970's, has emerged from lecture-type courses to a less structured inquiry and guided-discovery program. The inception of the curriculum change in Newfoundland has exposed students to learning through process within the laboratory-classroom setting. Although many of the activities performed are based on the premise of learning by doing, many of them are ends in themselves and have little relationship to a students everyday world. If it is assumed that students should understand and participate in a society of an ever diminishing natural environment which is science-oriented, then it seems that teaching, especially science teaching, should help the child to develop understandings within the setting of the natural environment.

There are numerous environmental problems facing us today. Never before have humans faced the kind of crisis now enveloping the earth. A population increasing at a rate that threatens to overwhelm the earth has brought overcrowding, erosion of soil, pollution of air and water, and unprecedented pressures on resources. Open space, in some areas of Canada, has become more and more difficult to hold. Ugliness and noise have intruded on our sensibilities. Wildlife habitats are disappearing and some species have vanished altogether. These topics and numerous others are in the minds of teacher and student alike.

The World Commission on Environment and Development (1989) suggests that an education to benefit the global ecosystem must draw from both an intimate understanding of the reality of local ecosystems and an understanding of how people need to use those ecosystems justly. Canada has also given its commitment to the building of an ecological future through the local ecosystem. In the fall of 1991, the Federal Government of Canada announced its intentions to distribute fifty-two million dollars over the next five years in order to enact its national plan for reversing the damage being done to the environment today and in the past. Canada's Green Plan for a Healthy Environment is the result of extensive consultations with Canadians from all walks of life. It is a national effort to build economic strengths in harmony with the environment, which is the basis of health and prosperity. The Green Plan describes 23 goals to ensure that Canada works towards becoming a sustainable society. Of particular relevance is the one goal that reaffirms the importance of focusing on natural regions in building a sustainable society: "Canada's Goal: Strengthen the nation's environmental science and technology, with a special emphasis on understanding regional ecosystems" (Government of Canada, 1990, p. 26).

This goal can only be met if the future citizens of this country become familiar with the local ecosystem in which they live, and this can only be realized through an science education that involves leaving the parameters of the classroom and laboratory and conducting field studies in the local community.

The outdoor experience; specifically the field trip or field study is becoming an important mode in the teaching of science and especially in environmental studies. Going outside does not mean that the regular classroom is not a vital center for learning. Taking a class outside means extending the schools' sphere of influence. To go outside means to take learning and apply it to the playground, the woods, the shoreline, and the city streets. The outdoor world is exciting, inspiring, and constantly changing. The mysteries to be solved and the beauty to be found are complementary to, not conflicting with, classroom learning.

Justification

Ausabel (1968) stated that the most important factor in learning something new is what the learner already knows. Other educators and psychologists (Aylesworth, 1963; Mullen, 1962; Piaget, 1964) for many years have insisted that a more effective learning takes place where that learning is connected with direct experiences. John Dewey called for more doing and less talking in our educational system. Piaget (1974) and many of his students have shown the importance of direct experience for children in learning the concepts of science (Elkind, 1976). Since the 1970's modern elementary science has been modeled around activities that enable young learners to ascend the ladder of cognitive thinking. In the secondary school sciences of biology, chemistry, and physics it is fundamental that students do the laboratory work to see for, and prove to, themselves the concepts described by their texts and teachers. Most science, however, does not fall into this structured laboratory setting. Concepts like soil erosion, succession and the ocean biome are objects and processes of natural science and can only be brought into the classroom in an artificial way. Topics like the rain forests and volcanoes, by their natural constraints of geographical distribution, can only be brought into the classroom in the form of pictures, models, and diagrams for students to observe and study.

The Newfoundland outdoors is an educator's paradise. The majority of schools in Newfoundland have easy access to the ocean biome, to forests, streams, rivers, and the wilderness. There are many opportunities for teachers and students to explore their natural surroundings and to come to a more intimate relationship with nature and their particular ecosystem or ecosite.

With this vast resource in our backyard, we must ask ourselves, are Newfoundland educators making use of this tremendous outdoor classroom? What things are needed to facilitate them in acquiring a more outdoor education framework for science teaching?

The extent and the characteristics of the use of Newfoundland outdoor resources in the teaching of science has never been studied. Most studies in the area of field studies have been to show the merits of this type of instruction in terms of student affective and cognitive gains (Harvey, 1951; Brady, 1972; Folkomer, 1981; Wiley and Humphries, 1985; Kern and Carpenter, 1986; Lisowski, 1987; Wise and Okey, 1983). A small number of studies has focused on the status of field studies as it relates to a particular field of science or in specific areas of the United States (Hollenbeck, 1958; Mason, 1980; Keown, 1986). These studies have stressed the need for more work in this important area of science education. Glenn (1968) called for a comprehensive study of outdoor experiences and an examination of the extent to which field trips were used by schools. Keown (1984) states that for the sake of improving the field study aspect of natural science teaching, there is a need for definitive information concerning the frequency of use and characteristics of field trips being carried out by science teachers. Especially needed is information concerning the strengths and weaknesses of programs that prepare science teachers for carrying out meaningful and motivating field activities with students. From consultations with teachers of science in the intermediate and secondary school system in Newfoundland, the researcher has seen a hesitancy on the part of teachers to enter the outdoor classroom. Frequently, this has stemmed from either the lack of acquaintance with local biota and the local ecosystem, or from inexperience in designing and conducting a meaningful field experience for high school age students.

The Problem

The purpose of this study is to assess the use of outdoor resources in the teaching of Intermediate and Secondary Science in Newfoundland schools, and to ascertain what impediments exist to its use as well as to obtain suggestions from Science Teachers to facilitate and improve the use of the outdoor classroom in their science teaching. It is hoped that this study will help to encourage an even greater use of field trips in the science curriculum.

The researcher developed a list of possible questions to ask teachers concerning their use of field studies in science. Then, a comprehensive review of literature showed many areas of concern in the area of field trips in science education. From these two areas, a number of common themes became prevalent. The researcher studied these ideas and produced a list of 13 research questions concerning the use of field studies in the science curriculum.

Specifically, answers to the following research questions are sought:

1. What area of the science curriculum makes the most use of field studies?

2. What is the extent of use of the outdoors for classroom science instructional activities?

3. What are the critical factors limiting the use of the field trip for science instruction?

4. What has been the main source of preparation for science teachers (B.Sc. or B.Ed. Programs) in using the field trip experience?

5. Are the university programs preparing science teachers to be confident outdoor educators?

6. What sites are being used as field sites by science teachers?

7. How far are these field sites from the school building?

8. What is the typical length of field trips conducted by teachers?

9. What type of resources do teachers use when planning field trip activities?

10. What opinions do teachers have concerning the use of field trips in the science curriculum?

11. How do teachers perceive their local school administrator's support of field trips?

12. What suggestions do teachers have for improving the use of outdoor science teaching?

13. What types of activities, do teachers feel, should be included in an outdoor science curriculum?

Scope and Limitations

This study is conducted to determine the use of outdoor resources in science teaching in Newfoundland schools, to ascertain what impediments, if any, exist to its use, and to obtain suggestions from science teachers for increasing and improving the use of outdoor resources in the science curriculum. The research is directed at intermediate and secondary school science teachers in the province of Newfoundland and Labrador.

A major limitation of this study is a mailout type questionnaire/survey instrument which usually has a very low response rate. Every effort was made to ensure a good response rate with follow-up letters and/or telephone calls to the subjects.

Although every effort was made to avoid ambiguity of statements or phrases in the survey instrument, ambiguity is possible with any research. No doubt this holds true for the present study.

Basic Assumptions

This study involves two basic assumptions:

1. The instrument used measures the frequency and characteristics of teacher use of field trips in science teaching.

2. The subjects responded to the questionnaire in a frank and conscientious manner.

Educational Significance

This study is designed to access the use of outdoor resources by science teachers and to obtain information from science teachers on increasing and improving the use of outdoor resources in science teaching. The significance of the present study is it functions as a needs assessment of teacher education in this area. It is hoped that this work will prove beneficial to the design and implementation of preservice and inservice programs, as well as curriculum units for teachers of intermediate and secondary school science.

Chapter Outline

The next chapter gives an in-depth study of related literature in the area of field studies. The literature reviewed includes the general goals of education as it relates to field instruction, the general perception of field trips, attitudes toward field trips, cognitive learning in the environment, novel setting effects, environmental effects on learning, teacher preservice and inservice education, status of field trips, and the implications of using field trips in science instruction. In Chapter Three a detailed research methodology is outlined. The questionnaire development and design is outlined with a detailed overview of how the population was obtained. Chapter Four presents the analysis and interpretation of the data obtained through the survey instrument.

The last chapter, Chapter Five, summarizes the findings and presents conclusions and recommendations based on the results.

CHAPTER TWO

A Review of Literature

This chapter will focus on the research available on field studies in the science curriculum. It will look at the general goals of education, how field studies can help fulfill those goals, the effect of field trips on a students cognitive and affective domains, learning in the environment, teacher preservice and inservice education and the status of field experience. The chapter will conclude with implications of field trips in Science Education.

General Goals of Education

Piaget (1967) has stated that:

> The principle goal of education is to create men and women who are capable of doing new things, not simply repeating what other generations have done ... who are discoverers. We need pupils who are acting, who learn early to find out by themselves, partly by their own spontaneous activity and partly through the materials we set up for them. (p. 137)

One of the greatest problems facing any educator today is finding exciting and innovative ways to stimulate interest and motivation in the subject matter being taught to the student. This is especially true of science. Bloom (1976) has stated that interest in science accounts for twenty or twenty-five percent of the influence on achievement in science. In today's increasingly complex, scientific and technological society, it is the educators' responsibility to find ways in which to develop an early interest and curiosity in the students, so that we can aid in developing the future technicians, scientists, leaders and voters. Our society is constantly changing and students must be prepared through scientific literacy to shape their own future. Andrew (1970) states that the concept of science is changing to include recognitions of the inescapable link of science and human values. It should also include the current importance of an integrated approach to scientific inquiry and a total picture of science which includes the application of science in our society.

Field Studies As A Way of Achieving These Goals

One of the best methods for achieving this stimulation in the sciences, as well as developing future citizens with scientific responsibility, is the out-of-classroom experience. Learning through experiences with opportunities for sharing in decisions has long been elements of Dewey's philosophy (Dewey, 1938). Bloom (1976) has also suggested that learning from experiences outside the classroom will contribute to new interests in subjects, attitudes and value changes, and that these will result in making school learning more stimulating. Schubert (1977) has argued that it is his conviction that children learn best when they are active, that they thrive on variety, and that assimilation of a variety of active experience is a most profound form of learning for children.

Field studies can capitalize on the student's inherent interest in nature. These activities allow them to experience reality and give them experience in problem solving through experimentation, observation and drawing conclusions. When the outdoors is used as a laboratory for learning, a freer relationship develops between the teacher and the student. This opening-up effect will encourage the student's interest and desire to achieve. It allows students to gain knowledge of community resources (Disinger & Lisowski, 1987). Field studies can include diverse areas such as ponds, rock quarries, swamps, beaches, parks, school grounds, farms, and the ocean. Isenberg (1967) feels that activities outside the classroom can be used to motivate reluctant learners; that children learn more quickly, retain longer, and find learning more exciting. Moreover, Rosenstein (1976) believes field studies reinforce and enrich classroom learning and makes it more meaningful and enjoyable. Field studies involve first hand learning experiences which emphasize the interrelationships between human beings and the real world in which they live.

This type of instruction gives the students an awareness of themselves and their surroundings. We are confronted with many problems today, such as crowded living conditions, abuse of our natural resources, loss of much of our open lands, chemical spills which kill the animals and plants that inhabit the area, and other types of pollution. Students with a greater appreciation of the outdoors will be able to make more intelligent decisions concerning these problems (Wiener, 1967). Wiener indicates that education in this form can prepare students to make the best use of the outdoors for themselves and society. He also believes field studies can be used to point out the unity of nature and man's place in this unity. Rillo (1976) believes that the basic steps of effective outdoor studies are observation, reflection, and research; that direct observation arouses interest, curiosity and desire for investigation; and further, that desire for learning then becomes important and significant to each individual.

The Field Trip

"A field trip, by definition, is any journey taken under the auspices of the school for educational purposes" (Sorrentino & Bell, 1970, p. 12). Generally, students are taken from the traditional learning environment (the classroom) to another location, usually on a non-routine basis, for a specific learning experience. Such a trip may involve extensive travel and time, as in the case of one teacher's four-day field trip to the Okefenokee Swamp for a sixth grade science class (Burton, 1985), or it may require only a half-hour trip to the school yard to examine and classify plants. Field trips may involve extensive outdoor activity, as with the whale watching voyages by Carkin's (1985) sixth grade classes; or they may be conducted inside as in an excursion to the planetarium (Sunal & Sunal, 1977).

<u>The General Perception</u>

"Taking school children to parks, school camps, nature centers, and other outdoor-enrichment settings is a standard practice in American education" (Falk, Martin & Balling, 1978, p. 127). Many teachers have reported using field trips with great success, but practical considerations such as the cost of transportation, student safety, and disruption of the school routine have caused many others to view field instruction with reserve. Fisher (1984) outlined reasons why teachers are reluctant to take students on field trips. He states that sometimes teachers use the excuse "there's no good place available". Sometimes it is not possible to have a field trip simply because the principal of the school says, "Nobody goes outside of the school building". Maybe there was a legal problem at one time and the school principal is now unwilling to risk another lawsuit. The school board may have been involved in some sort of altercation and has said to the principal and the superintendent, "No field trips around this school". Most school administrators insist that school field trips be lead by persons who have signed forms from the parents that protect the schools from insurance problems. Fisher (1984) also suggested that classroom discipline, along with feelings of inadequacy (not knowing enough about them) are two concerns held by teachers concerning field trips. In any case, field trips have been a popular topic in educational journals for more than 75 years, and their use has been extolled as an inherently productive teaching method. Apparently, however, that presupposition has been based largely on anecdotal sources.

A review of research on secondary science field trips by Sorrentino and Bell (1970), for example, revealed only 12 research studies from 1929 to 1970, with only five of those directly concerned with empirical assessment of the value of the field experiences. Sorrentino and Bell (1970) concluded that additional research is obviously needed, but "until further evidence is submitted, it is reasonable to say that field trips should be used in the teaching of secondary science" (p. 235). In the meantime, an increasing awareness of the benefits of the use of "hands-on-science" activities in science teaching has caused a new wave of interest and research into the merits of field trips.

Perceptions From the Perspective of Research

Since 1970, the relative instructional effectiveness of field experiences has been examined through quasi-experimental studies. That research provided substantial evidence to support the use of field instruction in science teaching, but many of those studies did not support the common presupposition that field trips are inherently productive instructional tools (Brady, 1972; Sorrentino and Bell, 1970; Disinger, 1987; Kern and Carpenter, 1986; Falk, Martin and Balling, 1978). Rather, the success of field instruction may be critically dependent upon several factors including careful planning, prior preparation of students, and the type of field trip needed for a particular learning outcome (Prather, 1989).

Scientific Attitudes

There is considerable research by Harvey (1951), Brady (1972) and others indicating that field trips are effective for promoting the development of scientific attitudes. Harvey concluded that students who were participants in field trips had significantly more positive attitudes toward science than students who remained in the regular classrooms. In a study of other values commonly attributed to field instruction in research conducted prior to 1970, however Sorrentino and Bell (1970) concluded: "the only ... value that is substantially supported by more than one empirical study is that field trips provide greater informational gains than other methods compared with it in the various studies" (p. 235). A review of research conducted since 1970 revealed evidence for a much wider application of field trips in science education (Prather, 1989). Still, much of the discussion has focused on the effectiveness of field instruction for the promotion of informational learning.

Cognitive/Conceptual Learning in the Environment

Cognitive learning related to the environment has typically been subsumed as a part of instruction in the more traditional areas of the secondary school curriculum, in particular in science and/or social studies classes. Because few secondary schools include discrete subjects in environmental areas in their curricula, presentation of environmental concepts generally is accomplished through the use of the same instructional techniques as those employed in the courses in which they are considered, generally focusing on in-the-classroom learning (Disinger, 1987).

A unique feature of environmental education is its intimate identification with outside-the-classroom phenomena. However, the typical pattern employed in such "in-the-environment" learning as does exist, is to concentrate on the affective, frequently the motivational, aspects of outdoor education and field instruction. Most of the research dealing with learning in the environment centres on non-cognitive areas (Disinger, 1984).

Field instruction for cognitive purposes is not an innovation of this era. Attempts to instruct in the field have been charted through the centuries, up to and including the present. Socrates and Aristotle led their followers directly to the natural environment for observation and discussion about nature; expressions of similar efforts still are being evidenced.

Early studies.

Schellhammer (1935) investigated knowledge gains of two groups of high school biology students. His study covered a period of one year. Experimental and control groups were established, with the experimental group participating in a field excursion. Posttests were given to both groups. Knowledge gains were found to be significant only with the experimental group. The groups were reversed (control becoming experimental and vice-versa), and a new unit of study was taught following the same procedures. The new experimental group showed more significant gains than did the control group.

Atyeo (1939) conducted a study in which he compared the results obtained from the use of an excursion technique with those of other teaching methods. He found that with an increase in excursions there was an increase in investigating the phenomena associated with the experience, and demonstrated that the excursion technique was superior to class discussion for teaching material requiring comparisons and knowledge of concrete objects. Specifically, Atyeo concluded field trips:

1. cause an awakening of interest and appreciation in the field of study and related fields of study;

2. give first-hand experiences and concrete, personal knowledge of the environment;

3. develop keenness and accuracy in observation; and

4. cause longer retention of the knowledge gained than other methods of instruction.

When testing the usefulness of field trip guidebooks, outlines, instructional materials, and associated techniques, Evans (1958) found that classes that used the planned field trip technique learned more, retained more, and did better on tests than did classes not participating in field trips. Testing the effectiveness of field trips in the teaching of college level botany classes, Kuhnen (1960) found that groups actively involved in field trips showed some, but limited, superiority in knowledge gain over control groups instructed in a laboratory setting.

Students of varying abilities.

Benz (1962) conducted an experimental evaluation of field trips for achieving informational gains in an earth science unit. Four classes of ninth graders (n = 109 students) participated in the study. The experimental groups went on excursions to sites of geological interest, while the control groups remained in the classroom and reviewed the content through slides. Based on comparisons of pretest and posttest results, Benz concluded that superior students tend to profit more from field trips than do students with average to less-than-average ability, but that field trips may contribute to the understanding of scientific principles for all students.

The effectiveness of learning geology through field experiences was probed by Glenn (1968), whose study involved a comparison of the field technique to the use of colour slides with classroom discussion. In none of the comparisons did the field trip group score significantly higher than the group taught with slides.

Goldsbury (1969) made a similar comparison, examining the effects on cognitive learning from the substitution of slide-tapes for an actual field experience. Test results indicted that the vicarious experience afforded through the slide-tape presentations was more effective than direct exposure to field trip experiences. However, direct experiences in the field coupled with exposure to slide-tapes in the classroom was found to be a more effective approach than either approach used separately.

Significant increases in student test scores resulted from use of pre-trip instructional materials, according to the results of a cognitive-gain study on a museum field trip experience for junior high school earth science students (Gennaro, 1981). An experimental group demonstrated statistically significant differences in gain scores as compared to a control group making the same field trip but without pre-trip instruction.

In research conducted by MacKenzie and White (1982), the effects of field work on retention levels were examined among eighth and ninth graders in Australia. Three groups of students were involved. The same general learning program was employed in all treatments, but with different approaches to the excursion phase; there was an active processing excursion group, a traditional passive excursion group, and a group that did not have field work. Two tests were given, one on achievement of unit objectives and the other on formation of episodes and linking them with other knowledge items. Both tests were given prior to formal instruction; posttests were given during the summer holidays, just prior to the beginning of the new school year. Posttest results indicated that the students who had field work performed better than did students who did not have either field component of instruction. Retention was superior in the group that participated in the active excursion program.

Folkomer (1981) found the benefits of field trips to be limited largely to the area of factual learning when employed for process-oriented instruction. In this study, three randomized groups of seventh grade geology students were exposed to three distinct modes of science teaching: lecturing, a combination of lectures and laboratory experiments, and field trips. The three groups used identical text books and process-oriented workbooks and studied the same three basic geologic processes. Group one was subjected to lectures on each process, and the second group was exposed to similar lectures plus laboratory experiments related to the process. Group three was taken on three field trips to areas exhibiting each of the geological phenomena. All sessions were tape recorded for evaluation; and the tapes showed fair similarity in teacher enthusiasm, content, and clarity for all sessions. The groups were posttested with an identical test containing a combination of factual and conceptual questions. The field trip group scored significantly higher on factual (observation) questions, Folkomer found; but there were no significant differences among group mean scores on conceptual (interpretation) questions. The first-hand field experiences provided significant benefits in the area of factual learning, he concluded, but benefits in the area of conceptual (interpretative) learning were not significant.

Folkomer's (1981) study did not indicate that field trips are ineffective for conceptual learning objectives. Rather, they simply were not found to be superior to the other instructional methods for promoting conceptual learning. Other researchers reported positive results using field trips to promote the development of abstract concepts. Wiley and Humphries (1985), for example concluded that "field trips are especially beneficial in their ability to develop abstract concepts in ways that are not possible in the classroom" (p. 126).

To evaluate the effects of field activities on student learning, Kern and Carpenter (1986) conducted a study with two sections of a college laboratory course in earth science. One section involved primarily classroom activities utilizing a laboratory manual, while field-oriented activities were employed in the other. Comparisons of the performance of the two classes at the end of the term revealed almost identical levels of lower-order learning (recall), but higher-order skills were demonstrated to a greater degree by the field-oriented section, indicating an enhanced ability to apply the information acquired.

Understanding and retention.

Designed to examine the nature of ideas that students hold about specific science concepts and to investigate modes of instruction that would effectively help them gain an accurate understanding of their world, Lisowski's (1987) study focused on students' conceptions of ecological concepts and the influence of field instruction strategies on their understanding and retention of these concepts. An experiential seven-day field program served as the learning experience for three independent groups of secondary students. These students responded to a specially designed cognitive instrument made up of higher-order items prior to, during, and four weeks after the field program. All groups exhibited significant posttest gains and showed evidence of retention of targeted concepts. Gains in scores in the major concept strands were positively related to the instructional emphasis given to those areas. The effectiveness of the field program was apparent, in that the specific concepts emphasized were learned and retained.

In Wise and Okey's (1983) meta-analysis of instructional strategies, one category examined was presentation mode. This category included those means of instruction where the setting was different from a traditional learning environment; field instruction was a targeted mode of learning within this category. The mean effect size obtained for cognitive and other (attitudinal, problem-solving) outcomes was .26, based on 103 studies. Thus, field instruction was usually found to be more effective than traditional strategies of learning.

Summary of cognitive learning in the environment.

The relative sparsity of research literature dealing with cognitive learning about the environment, in the environment, is an indication that little cognitive instruction in secondary schools takes place in field settings. However, those studies which have been reported indicate that field-based instruction is a teaching technique worthy of additional, extensive, rigorous study by educational researchers. The research data reviewed indicate that there are substantial achievement differences in the effectiveness of different approaches to field-based instruction. Both teachers and investigators should study successful approaches to improve their work.

Learning in the Natural Environment

McNamara and Fowler (1975) studied the effect of outdoor experiences that used available natural resources on differences in achievement, critical thinking, and preference for the environment. Their study involved 1,200 junior high school students enroled in earth science. Several conclusions important to the methodology of natural science teaching came from their study:

1. Concepts that are an integral part of the students' environment are best learned in the outdoor environment.

2. If parts of a concept can be related to the students' immediate environment, the concept has a better chance of being understood, whether the concept is concrete or abstract.

3. Critical thinking is enhanced in the outdoor environment; this is especially true for the average to below-average student.

4. Investigations in the outdoor environment increase the students' desire for that environment.

5. Lower ability students tend to prefer the environment to which they are exposed.

Novel setting effects.

Other research indicated that student familiarity with the field setting may be a critical factor in both concrete and abstract conceptual learning. In an analysis of the effect of the novelty of a field trip setting on a group of elementary school students, Falk, Martin and Balling (1978) concluded that substantial gains in observational knowledge will almost invariably occur among field trip participants; but they may not always be the gains the teacher intended. To test the effect of environmental novelty on student behaviour and cognition, two groups of students ranging from ten to thirteen years of age were chosen for match in age, race and distribution of academic attitude. The students were assigned the task of measuring foliage height density in a forested area unfamiliar to both groups. The test (Unfamiliar) group was chosen from a school in the middle of an urban area where most children would have little opportunity for exposure to a forest environment. The control (Familiar) group was chosen from a non-urban school in a neighbourhood surrounded by woodlands. Familiarity with the setting constituted the independent variable, and cognitive conceptual learning constituted the dependent variable for the test.

Both groups were pretested for knowledge of the concepts to be learned and for knowledge of the sort of area to be visited. The same test was used for post-testing to see how the behaviour generated by the novelty of the field area interacted with the structured learning activity. Both groups benefitted (learned) significantly, but in markedly different ways. In the Unfamiliar group "exploration and setting-oriented learning took precedence over task-oriented conceptual learning" (Falk et al., 1978, p. 132); whereas the group that was generally familiar with a forest environment "was able to do both setting and task learning simultaneously" (Falk et al., p. 132). The Unfamiliar group actually showed a slight decline in performance from pretest to posttest on the conceptual test, which suggested no concept learning. Falk, Martin & Balling (1978) concluded, however, that phenomenon does not negate the worth of field trips. Rather, the disequilibrium created by the need to explore and/or the fear of strange places is a powerful, natural motivator for learning that should be accommodated into field trip planning.

> The novel field-trip phenomenon should not be considered as a negative behaviour to be overcome before "real" learning can occur, but rather as a dialogue between the child and his environment--something to understand and capitalize upon. Increased research will help to illuminate the issue of what type or types of internal and external behaviours are involved in adjusting to novel settings and how to pedagogically benefit from this knowledge. (Falk et al., 1978, p. 133)

Environmental effects on learning.

The recent growth of the field of environmental psychology has suggested a reassessment of many educational phenomena traditionally viewed as issues of individual differences or informational organization. Noteworthy examples include the effects of school size on high school role performance and satisfaction (Baird, 1969; Barker & Gump, 1964; Willems, 1967), social climate on school learning (Moos & Moos, 1978; Nielson & Kirk, 1974; Randhawa & Fu, 1973), and school design on learning related behaviours (Beeken & Janzen, 1978; Weinstein, 1979). Thus, at least certain aspects of the environment or setting for learning have emerged as important to the educational process. One common educational activity which can be considered from the perspective of environmental psychology is the field trip.

Teacher Pre-Service/Inservice Education

There are a number of different types of studies dealing with the effect of preservice and inservice teacher training on the use of field trips in the curriculum. Chrouser (1975) tested elementary teachers enroled in a biology course to compare the effects of learning by the indoor laboratory and outdoor laboratory approach. Significant differences favouring the outdoor situation were revealed by the Test on the Social Aspects of Science. Other tests indicated significant differences for the outdoor laboratory for specific biological principles and in the understanding of science as process. Student test results for general biological principles and critical thinking revealed no significant differences. Based on these findings, the investigator concluded that the outdoor setting should be used where feasible and appropriate for specific biological principles when training elementary science teachers.

Some other studies have mixed results on the effectiveness of field trips for teachers in training. Kuhnen (1960), studied the field trip technique compared to the laboratory approach in teaching certain units of botany to three successive groups of college students. Significant differences, for nearly all of the objectives studied, favoured the laboratory method for achievement in botany. For application of principles, the field methods showed a slight advantage (not significant), and the same was true for stimulation of interest in botany. On the basis of this experiment, it appeared that the laboratory was superior to the field trip for increasing knowledge but it made little difference which approach was used in the areas of application of principles and interest development.

Status of Field Experiences

Student perceptions.

Studies in this area are very varied. Hollenbeck (1958) studied Oregon children in an attempt to see if they had the opportunity to participate in outdoor science activities. In general, the opportunities were very limited as less than one-half the sample had outdoor science experiences. The most common use of school trips was in geology (Hollenbeck, 1958).

Tinkle (1933) completed a study to determine the extent of field work completed. He revealed that the amount of field work conducted by teachers depended on the inclination of the individual instructor. Tinkles' survey showed that about half the biology classes had not conducted field work. The highest number of trips taken by any one student was twenty. For those classes where field trips were conducted, the average was about six. This study was further supported when Stevenson (1940) surveyed College students in Oregon and California to determine the extent of their high school field experiences in biology. About 40 percent of the Oregon and California students had been involved in biology field work which was significantly less than a West Virginia group with which they were compared. In the second aspect of the study, teacher-training students reacted to their college level field work in biology. They were overwhelming in favour of field work to help in gaining knowledge, improving techniques, and stimulating their interests. Collings (1950) conducted a study of Detroit Public School pupils to determine the amount of direct experience (contact with the community) they were receiving. A questionnaire was administered to a sample of grade six, grade nine and grade twelve students. Some conclusions indicated that the students had encountered few enriching direct experiences and that socioeconomic status did not seem to affect direct experience. Also, some schools were not making sufficient use of neighbourhood facilities for direct experience.

Hollenbeck (1963) surveyed high school seniors to determine the amount and kind of outdoor science experiences provided for Oregon school children. Results of this questionnaire indicated that the opportunity to participate in outdoor science experiences was limited. A more recent study by Strawitz and Malone (1984) was completed to determine whether the field experience component of an undergraduate science methods course influenced teachers concerns and attitudes toward science and science teaching. Results indicated that field experiences did not significantly change student concerns about teaching science but significantly improved student attitudes toward science and science teaching.

Teacher perceptions.

Even though general sentiment is supportive of the value of learning in a direct environmental setting, actual efforts at implementation of field instructional programs have been limited. Mason (1980) identified a number of factors contributing to a limited instructional use of field activity, among them lack of planning time, lack of resource people for assistance, failure of the school to assume trip risk, lack of satisfactory method of covering other classes, restrictions placed on field work by school regulations, lack of administrative leadership, support, and encouragement, lack of funding, limited available transportation, too much "red tape", and excessive class size. Disinger (1984) additionally suggested a lack of teacher commitment to the concept of the field instruction: "it is 'easier' to teach in the classroom than to plan and implement outside-the-four-walls initiatives" (p. 43). A comprehensive study of the use of outdoor resources by secondary science teachers was carried out by Keown (1986). The study showed that about 16 percent of the classes do not study science outdoors and the majority of the classes use outdoor resources fewer than three times during the school year. Financing the travel and large class size was found to be the main impediments to outdoor natural science.

A Newfoundland perspective.

Sutton (1987) completed a comprehensive study of the Searching for Structure Grade VII program in Newfoundland schools. His study dealt with perceptions of teachers on various aspects of the program. A number of statements dealt with outdoor activities in Science. The teachers guidebook for Searching for Structure states that:

> One of the important inclusions in this program is the provision for a wide variety of out-of-the-classroom learning experiences. This practice recognizes that not all science can or should be performed in the classroom or laboratory. Furthermore, to take students away from the classroom is an important teaching strategy. Students enjoy such studies and find much to motivate them for their related classroom

work; and they benefit from the change in routine. (Sutton, 1987, p. 63)

Sutton's results showed that 71.2% of the teachers considered outdoor activities very important to the teaching of this course. Sutton (1987) also concluded that 27.9% of the teachers perceived that the activities in the course were not practical for Newfoundland students. There were statements from teachers that the program should be modified for local areas and that the present activities were totally inappropriate for Western Labrador. The majority of teachers, 56.2% did not perceive the location of their school as posing serious problems for their efficient teaching of outdoor activities in the course.

Overview

Research results provide much evidence to support field work as an effective instructional technique at the elementary, secondary and college levels. Although results are mixed, nearly all the evaluation studies have demonstrated that students learn well from field instruction. When comparisons have been made with conventional methods of instruction, the field techniques have been as effective or more so than other methods; the differences have often been statistically significant.

Some studies revealed convincing evidence that the worth of field trips scheduled as one shot, optional, or otherwise peripheral class activities is very questionable. Koran and Baker (1979) further concluded that, because of the time, cost, and difficulty involved, field trips "cannot be justified ... if they are limited to achieving outcomes similar to those that can be achieved in the classroom" (p. 60). Improperly used, they may be little more than an entertaining excursion. The research also clearly demonstrated, however, that when planned and conducted as an integral component of the overall science instruction program, field trips are invaluable instructional tools that are uniquely applicable to science education. When properly employed, they are much more than an entertaining outing; they are an exciting and effective learning experience for both teachers and students.

Some Implications For Science Education

Several researchers, for example, Falk et al. (1978), reported problems with the application of field trips for certain instructional objectives. In most cases, those researchers did not cite those problems as reasons for discounting the worth of field trips. Rather, they generally offered positive suggestions by which those detracting factors could be overcome by more thorough planning and preparation. According to Simpson and Anderson (1981), few teaching methods require more planning or involve more work than taking a field trip. But, they contended, field instruction is a powerful educational tool and a dramatically effective means for changing students' attitudes toward science; and, if properly employed, the benefits are well worth the cost and effort.

Field trips may offer a great variety of educational benefits including: broadening the students' environmental experience and insight; increasing their process skills; promoting inquiry learning; reinforcing classroom lessons; promoting social skills; improving attitudes towards science and science education; and direct student involvement with the subject matter. Field activities may help students to learn by doing (King & Abbott-King, 1985) and to apply what they have learned (McClure, 1985). Field instruction helps to "bring science to life" (King & Abbott-King, 1985, p. 55) and may help students to better internalize new knowledge by enabling them to bring their own experiential background to bear on what they have learned (Hancock & Farris, 1988). Field trips are especially effective for promoting informational gains (Sorrentino & Bell, 1970). The group participation may promote student self-confidence, enhance social skills, and facilitate the emergence of leadership (Hancock & Farris, 1988).

If the optimum science outcome is to result from the use of field trips, however, careful attention must be given, by the teacher, to two major student characteristics: the level of environmental experience; and the academic background (Falk et al., 1978). If the field area is too strange, the students' desire to explore and/or their fear of strange places may overpower the motivation to stay on-task. Likewise, if the students' background knowledge of the subject to be studied is insufficient, the object of the lesson will probably be lost. "Before you take your ... show on the road," King and Abbott-King (1985) concurred, "give your students a brief lecture on the specifics of the site they'll be examining so they'll have an idea of what to look for" (p. 54). From the research available on this topic, neither the importance of adequate pre-excursion planning and student orientation nor the need to select an appropriate type of field trip for the intended science outcome can be overemphasized.

Wiley and Humphries (1985) emphasized the importance of the selection or preparation of an appropriate type of field guide for the instructional objectives. Koran and Baker (1979) recommended the use of advance organizers such as lectures, slides, or supplemental reading related to what the students will experience in the field to provide a conceptual structure for incorporating and interpreting the experience. There is evidence, Koran and Baker reported, that this "may be most useful to the average and below average student" (p. 59). Gagne (1970) suggested that abstract concepts taught in the classroom may require field experience to bring them into concrete form. If so, adequate academic preparation is essential prior to the actual field visit if a student is to make a successful transfer from idea to reality. Teaching the basic concepts and processes to be investigated in the field prior to the field excursion would let the students know what to look for and alert them to the fact that what they have learned will be reinforced with firsthand observation and experience.

Teachers must also become completely familiar with a field site before taking students to it, Koran and Baker (1979) added, and the students should be made aware of the objectives of the trip to help them focus on the intended learning activities. A classroom lecture or other presentation on the specifics of the site to be visited may also be needed to help reduce possible student anxiety. An urban youth with no conception of the wilds other than that obtained from textbook pictures or television programs, for example, may experience anxiety or outright fear on their first encounter with the strange sounds and smells of a forest environment. A rural youth who has seen hundreds of television shows depicting violence on urban streets may feel very threatened on a field trip to the inner city.

Without proper student orientation, Falk et al. (1978) implied, an extremely unfamiliar field setting may cause sufficient stress to block any meaningful, positive learning experience. In cases of exceptionally novel environments, it may be necessary to take students on an orientation trip to enable them to satisfy "very powerful needs for exploration" (Falk et al., p. 133) that otherwise may interfere with task learning. In a study of the use of planetariums in education, Sunal (1973) also suggested that greater student performance can be generated by orientation visits or by classroom orientation with a movie showing what the projection area looks like, how the projector is made, and how it works. Otherwise, the novelty of the planetarium, especially that weird, multimonocular monstrosity dominating the front-center of the seating area, may simply overpower the students' motivation to stay on-task, especially on the first visit.

Safety as such was not a topic of research in the literature reviewed, but it should be a primary concern in any field trip. Field trips can be very exciting learning experiences; but, King and Abbott-King (1985) cautioned, "be sure you and your students are safe while you learn" (p. 53). Lack of adequate preparation for field trips can result not only in minimal cognitive development but also in increased risk of physical injury. A pre-trip lecture on the physical features of the field area and the safety precautions required would help to minimize physical danger to the students as well as prepare them mentally and emotionally for their field experience. Pre-trip demonstrations and student exercises on the safe use of the field tools and equipment to be used are also recommended to reduce student risk.

Summary

A review of research on the effectiveness of field trips clearly supported the use of field instruction for both factual and conceptual learning as well as for affective objectives. Compared to other traditional teaching techniques, field trips may provide an especially rich stimulus setting for content learning. They also may excel in generating an inclination to learn based on a natural desire to know about novel environments. On-site observation and data gathering activities may be employed to enhance students' science process skills; and field experiences may also contribute to an understanding of complex scientific concepts by helping students to relate abstract subject matter to the real world.

The research also clearly indicated that field trips are not necessarily the inherently effective instructional tools that many people have perceived them to be, especially in the case of one-shot trips to extremely novel environments. Much learning, it appears, naturally occurs on any field trip; but careful planning and preparation is required to insure that the learning will be related to the intended instructional objectives.

Field trips are enrichment events in any case, but how effective they are in providing a structured learning experience as opposed to an entertaining outing, depends directly upon how well they are planned. They are also one of the most productive instructional methods available to the science teacher if, but only if, used in connection with other methods such as lectures, laboratory activities, audiovisuals, assigned reading, and so forth to introduce the concepts and/or processes to be studied.

Many past studies focused on whether field trips were effective tools for science teaching. That research produced substantial documentation of their worth. The subject matter of science "does not originate in a textbook, but in nature itself" (Hancock & Farris, 1988, p. 48) and field trips may be especially useful for helping learners bring their own experiential backgrounds to bear on the task of assimilating scientific knowledge obtained from classroom lectures, laboratory exercises, textbooks, and other sources. Much additional research is needed if this and other benefits of field instruction are to be realized. Given the need for effective reforms in science teaching, that research should be a top priority in science education.

CHAPTER THREE

Methodology

This study has gathered data from teachers regarding the extent of use of natural field studies in the intermediate and senior high school science classrooms in Newfoundland and Labrador. This chapter provides information on the instrument used as well as the information on how the instrument was validated. The reliability of the instrument is discussed and the procedures are put forth for the analysis of the data.

The Instrument

The development of the instrument (Appendix B) for this study proceeded in the following way. First, a comprehensive literature review pertaining to the status of outdoor field studies was completed by the researcher. This research (Hickman, 1975; Keown, 1986; Hall & Wright, 1980; Mason, 1980; Wall & Quib, 1972; Hansen, 1983; Bybee, 1971) was studied and analyzed. From this initial overview of the research, the researcher created 13 basic questions concerning the use of field trips in science education. The instrument developed from these basic questions was a survey/questionnaire comprised of two sections. Section A dealt with personal and demographic information. Section B asked teachers to rank certain activities as they related to outdoor field studies in the Newfoundland science curriculum.

In all research it is important to find out information about your respondents. Section A was made up of eight items which requested demographic, personal and professional information from the respondents. The respondents were asked to indicate which area of the province they live in, their sex, their age group, the number of years teaching experience, the number of years science teaching experience, the science courses they are presently teaching, the approximate size of the community in which they live and, finally, the total number of science credits they had acquired.

Each of the 11 items contained in Section B of the questionnaire referred to a subject's range of experiences with field trips in the curriculum. Each subject was asked to either give factual information, make judgements, express opinions, or give attitudinal responses to statements. Most of the items on this part of the questionnaire required Likert type responses. These could be scored on a four point scale 1=not important, 2=somewhat important, 3=important or 4=very important or rated as 1=never, 2=sometimes, 3=often or 4=very often. A few required respondents either to 1=disagree or 2=agree. Statements that required opinion-based responses were written in both the positive and negative forms to counterbalance the tendency of individuals to choose statements that are written in the positive form. Table 1 lists the specific research question and the corresponding items on the questionnaire.

Table 1

Research Questions And The Corresponding Items On The Questionnaire/Survey

Research Question	Corresponding Questions on the Questionnaire
What area of the science curriculum makes the most use of field studies?	B.1.
What is the extent of use of the outdoors for classroom science instructional activities?	B.1.
What are the critical factors limiting the use of the field trip for science instruction?	B.2.
What has been the main source of preparation for science teachers (B.Sc. or B.Ed. Programs) in using the field trip experience?	B.11. (a) - (e)
Are the university programs preparing science teachers to be confident outdoor educators?	B.2. (g) B.6. (c) B.7. (c) B.3. (e) B.6. (i) B.11.
What sites are being used as field sites by science teachers?	B.4. (a) - (e) B.5. (a) - (e)

(table continued)

Research Question	Corresponding Questions on the Questionnaire
How far are these field sites from the school building?	B.10. (a) - (d)
What is the typical length of field trips conducted by teachers?	B.9. (a) - (f)
What type of resources do teachers use when planning field trip activities?	B.3. (a) - (f)
What opinions do teachers have concerning the use of field trips in the science curriculum?	B.6. (a) - (n)
How do teachers perceive their local school administrators' support of field trips?	B.2. (1) B.6. (1) B.6. (h) B.7. (e)
What suggestions do teachers have for improving the use of outdoor science teaching?	B.7. (a) - (o)
What types of activities, do teachers feel, should be included in an outdoor science curriculum?	B.8. (a) - (v)

The Population

The population consists of all science teachers teaching the science curriculum in either the intermediate or senior high in Newfoundland and Labrador schools. The entire population was obtained by first writing a letter to the Superintendent (Appendix A) in each of the 27 school boards in the province seeking their support, cooperation and permission to administer the questionnaire to all teachers of intermediate or senior high science within their schools. As well, the superintendents were asked to return an attached sheet containing a list of the number of schools and the number of teachers in each school that were teaching intermediate or senior high science. From this initial contact a tentative list of teachers was developed. Another letter and/or phone call followed to complete the list of teachers. From this, a list of 465 teachers was obtained. This list represented all the teachers teaching either the intermediate science curriculum or the senior high science curriculum in Newfoundland and Labrador. A letter and questionnaire were sent to each of these teachers. (Appendix B).

Method of Data Collection

The present study involved the construction and administration of a Likert-type scale questionnaire to science teachers in Newfoundland and Labrador. Once the list of 465 teachers was obtained, each was sent out a letter and a questionnaire (Appendix B). The letter described the purpose of the study and contained information regarding how to fill out the questionnaire. The teachers were asked to complete the questionnaire and return them by a certain date in the enclosed self-addressed, stamped envelope. If the questionnaires were not returned within the specified time, another letter (Appendix C) was sent to each teacher asking them to please forward their completed questionnaire, if they had not already done so, as soon as possible. If the questionnaires were not returned after a further month they were not included in the sample. The first ten questionnaires were put aside on their return and compared with the last ten received to check to see if they were similar in response. A total of 465 questionnaires were mailed out and 256 or 55%, were returned. In general, a return rate of 50% for mailed questionnaires is considered average for graduate student surveys (Borg, 1963).

Validation of the Instrument

In order to validate this instrument a number of procedures were followed. A copy of the questionnaire was distributed to two professors of Science Education courses in the Faculty of Education at Memorial University of Newfoundland. These individuals were asked to examine the instrument for clarity, suitability and relevance, readability and omissions or additions. Six students in two graduate courses were asked to view and comment on the instrument. Five teachers from several schools were also asked to complete and critique the questionnaire. These suggestions and criticisms were taken into consideration and the instrument adjusted accordingly. The overall response to the questionnaire was quite positive. All individuals thought the survey to be comprehensive and well-organized.

Assumptions and Research Questions

In order to conduct research one must begin with the basic assumptions. This study deals with teachers use of field trips in science education. Therefore, the first assumption is the validity of self expression. It was assumed that the respondents were free to express their feelings about what was asked and were honest in the responses they gave. The second assumption is that perceptions of the respondents were based on their experiences as teachers and their knowledge about the intermediate and secondary school curriculum in Newfoundland and Labrador. The third assumption is the validity of the direct approach which the study makes use of in a structured questionnaire. The nature of this study is exploratory; 13 research questions were selected as a basic framework. However, statements on the structured questionnaire were not restricted specifically to these 13 basic questions concerning the basic aspects of field trips/field studies in science education.

Limitations of the Questionnaire

The questionnaire was developed after a thorough review of the literature concerned with field trips in science was completed. Since this questionnaire was designed by the researcher it may contain flaws and ambiguities. Every effort was made to avoid these problems by contacting content experts for proofreading and pilot testing the instrument before dissemination.

Statistical Analysis

The scoring procedure employed was completed and the data analyzed using the statistical package for the social sciences, SPSS-X. Descriptive statistics such as means, standard deviations and percentages are presented. These descriptive statistics were applied to all Research Questions to determine the percentages of the different responses for each specific item. The results will be analyzed in Chapter Four and conclusions and recommendations presented in Chapter Five.

Ethical Considerations

In complying with the requirements of the Ethics Review Committee the researcher provided to the participants an attached letter of introduction to the study. The letter of introduction provided the following information:

1. It identified the researcher by name and title.

2. It provided a brief and adequate description of the purpose of the study and all the procedures to be carried out.

3. It provided an estimate of the amount of time that was required to complete the questionnaire.

4. A statement to the effect that the returns of the completed questionnaire would constitute their consent to the researcher using the data.

5. The subject was promised that the data would be used with complete anonymity.

Chapter Summary

Every effort was made before the data collection phase to produce a survey instrument that was both a valid and reliable measure of teacher perceptions and the use of field trips in science teaching. All school boards were contacted to prepare a list of teachers of the intermediate and senior high science courses in Newfoundland and Labrador schools. Each teacher on this list received a letter outlining the purpose of the study and a survey/questionnaire to complete. Another letter and/or phone call followed in order to increase the rate of return. The next chapter provides an in-depth analysis of the data collected.

CHAPTER FOUR

Analysis

This chapter is a report of the data analysis of the study. Following a general description of the sample, the results of the analysis will be reported. Each question on the survey will be addressed separately, as well as other findings that were significant.

Description of the Sample

Of the 465 questionnaires that were disseminated, 258 were returned, two of which were spoiled, leaving a total of 256 respondents (55%).

From Table 2 it is evident that of the 256 respondents, 219 (85.9%) were male and 36 (14.1%) were female. This is representative of the population surveyed, since there were 364 (78%) male teachers and 101 (22%) female teachers surveyed. With respect to the age of respondents, Table 3 shows that 11.4% were less than 25, 32.2% were between 26 and 35, 41.6% were between 36 and 45, 14.1% were between 46 and 55 and .8% were over 55.

With respect to the number of years teaching experience, Table 4 indicates that, 22.7% had 0-4 years, 13.7% had 5 to 9 years, 13.3% had 10 to 14 years, 23.4% had 15 to 19 years, 18.8% had 20 to 24 years and 8.2% had more than 25 years teaching experience.

Table 2

Information On The Sex Of Respondents

Sex	N	%
Male	219	85.9
Female	36	14.1
Missing	1	
Total	256	100

Table 3

Information On The Age Of Respondents

Age	N	%
< = 25	29	11.4
26 - 35	82	32.2
36 - 45	106	41.6
46 - 55	36	14.1
> 55	2	0.8
Missing	1	
Total	256	100

Table 4

Information On The Teaching Experience Of Respondents

Teaching Experience (Years)	N	%
0 - 4	58	22.7
5 - 9	35	13.7
10 - 14	34	13.3
15 - 19	60	23.4
20 - 24	48	18.8
25 or more	21	8.2
Total	256	100

Table 5

Information On The Number Of Years Of Science Teaching Experience

Science Teaching Experience (Years)	N	%
0 - 4	63	24.9
5 - 9	41	16.2
10 - 14	50	19.8
15 - 19	54	21.3
20 - 24	33	13.0
25 or more	12	4.7
Missing	03	
Total	256	100

Table 6

Information On Courses Respondents Are Teaching

Course	N	%
Junior High Seven	62	24.2
Junior High Eight	68	26.6
Junior High Nine	92	35.9
Biology	109	42.6
Environmental Science	55	21.5
Chemistry	79	30.9
Earth Science	21	8.2
Geology	23	9.0
Physics	84	32.8
Physical Science	28	10.9

Table 7

Approximate Community Size Of Respondents

Size	N	%
0 - 1000	83	33.1
1000 - 5000	95	37.8
5000 - 10000	31	12.4
10000 - 20000	19	7.6
Greater than 20000	23	9.2
Missing	5	
Total	256	100

Table 8

Information On The Number Of University Science Credits Completed by Respondents

Number of Credits	N	%
0 - 5	39	15.4
5 - 10	40	15.8
10 - 20	38	15.0
20 - 40	105	41.5
Over 40	31	12.3
Missing	03	
Total	256	100

The results for the number of years of Science teaching experience, from Table 5 were as follows, 24.9% had 0 to 4 years, 16.2% had 5 to 9 years, 19.8% had 10 to 14 years, 21.3% had 15 to 19 years, 13.0% had 20 to 24 years, and 4.7% had over 25 years science teaching. These results indicated that some teachers are teaching science along with other areas in the curriculum.

The respondents were asked to specify the science courses they were presently teaching. The results from Table 6 indicate that 24.2% of the respondents were teaching grade seven science, 26.6% were teaching grade eight science, 35.9% were teaching grade nine science, 42.6% were teaching biology, 21.5% were teaching environmental science, 30.9% were teaching chemistry, 8.2% were teaching earth science, 9.0% were teaching geology, 32.8% were teaching physics and 10.9% were teaching physical science.

The respondents were then asked to indicate the approximate size of the community in which they were teaching. Table 7 shows that 33.1% were from a small community with a population of between 0 and 1000 people, 37.8% were from a community with a population between 1000 and 5000 people, 12.4% were from a community with a population of between 5000 and 10000 people, 7.6% were from a community with a population between 10000 and 20000 people and 9.2 % were from a community with a population greater than 20000.

The researcher wanted to gather information on the number of university science credits held by each of the teachers in the survey. The results from Table

8 indicated that 15.4% had between 0 and 5 university science credits, 15.8% had between 5 and 10 science credits, 15.0% had between 10 and 20 science credits, 41.5% had between 20 and 40 credits and 12.3% had over 40 university science credits.

These results indicated that a large percentage, 41.5% of the teachers in this province who are teaching science have much university level training (between 20 and 40 credits) in the sciences.

There were slight differences in the total number of teaching years and the number of years teaching science in the curriculum.

<u>Analysis by Research Question</u>.

The following section will give the results for each of the 13 research questions outlined in previous questions. For each section the research question will be stated and the respective results indicated from the questionnaire.

Research Question #1: What area of the science curriculum makes the most use of field studies?

The specific question on the questionnaire asked teachers how many times during a typical school year do they take their classes on field trips for activities. Each science category was listed and a corresponding space left under the headings of Never, 1-2, 3-4, 5-7, 8-10, and 10+. Each of these will be discussed as it relates to each of the subject areas in the Newfoundland Science curriculum.

<u>**Junior High Science**</u>

This section analyses the results for the three grade levels in the intermediate science curriculum areas, beginning with grade seven in Table 9.

Table 9 indicates that 48.6% of the teachers who are presently teaching the grade seven science program take only one to two science field trips during the ten months of the school year. Only 7.1% of the teachers never take their students to the field for science activities. Approximately one quarter, 24.3%, of teachers take their students to the field between three and four times for science and 20.0% take their students on a field excursion more than five times during the school year. These results are surprising since the <u>Searching for Structure -Book One</u> in place in the schools across the province require field trips in the program objectives.

Table 10 indicates the results for the grade eight program. From these results it is apparent that the majority of teachers, 56.0%, teaching the grade eight science program, <u>Searching for Structure - Book Two</u>, only take one to two science field trips per year, 14.7% never go on field trips, 20.0% take between three and four field trips during a school year and 9.3% take more than five field trips in a year. These results are positive since the curriculum component of the grade eight science program does not emphasize the field component of science.

Table 11 outlines the results for the grade nine program. These results indicate that 29.3% of the grade nine science teachers in the province never take their classes on science field trips. More than half, 55.4%, take their grade nine classes on between one and two trips per year, 10.9% take their classes on between three and four field trips annually and only 4.5% take their classes on more than five trips during the ten months of the school year. These results are somewhat positive in regard to field trips in grade nine science, since the curriculum does not demand their use in achieving the course objectives.

Generally, the data for the junior high program, consisting of the grade seven, eight and nine science programs, revealed more teachers in the grade seven science curriculum take their classes on field trips than do either the grade eight or nine teachers. This result is an expected one, since the curriculum requirements for grade seven specify the necessity for out-of-the-classroom activities in the Life Science section of the course. However, given these requirements, 7.1% of grade seven science teachers never take their students to the field for activities. The grade eight and grade nine science curriculum components encourage the use of the field for activities; but they are not a necessity. With extra effort and planning, field trips could be easily included in both the grade eight and nine programs. From the research, it is evident that 14.7% of grade eight teachers and 29.3% of grade nine teachers do not take part in these excursions. In later sections the researcher will analyze possible impediments to using field instruction that may have contributed to these results.

Table 9

Frequency Distribution Of The Number Of Field Trips Taken For Grade Seven Science In One Year

Value	Frequency	Percent
Never	5	7.1
1-2	34	48.6
3-4	17	24.3
5-7	8	11.4
8-10	3	4.3
10+	3	4.3
Respondents not teaching grade seven science	186	
Total	256	100

Table 10

Frequency Distribution Of The Number Of Field Trips Taken For Grade Eight Science In One Year

Value	Frequency	Percent
Never	11	14.7
1-2	42	56.0
3-4	15	20.0
5-7	2	2.7
8-10	4	5.3
10+	1	1.3
Respondents not teaching grade eight science	186	
Total	256	100

Table 11

Frequency Distribution Of The Number Of Field Trips Taken For Grade Nine Science In One Year

Value	Frequency	Percent
Never	27	29.3
1-2	51	55.4
3-4	10	10.9
5-7	1	1.1
8-10	2	2.2
10+	1	1.1
Respondents not teaching grade nine science	164	
Total	256	100

Senior High Science

This section will report on the results for all senior high science courses. The areas of biology, environmental science, chemistry, earth science, geology, physics, and physical science will be discussed separately and then comparisons made of the results for all areas. The section will begin with a discussion of the area of biology in Table 12.

This table shows that 19.8% of the biology teachers responding never take their classes on field trips during the school year and 61.2% take their classes on one to two trips per year. No biology teacher responding to the survey took their classes on more than seven trips during the school year. Given the nature of the biology course in Newfoundland schools, it is surprising that teachers do not take their students to the field more often for science instruction. In the present biology curriculum which covers such areas as Man in the Biosphere and all areas of Ecology, it almost seems a necessity to take regular field trips to local sites to study the concepts in these areas.

Results for environmental science, in Table 13, indicate that 7.6% never take their environmental science classes on field trips, 47.0% take one to two field trips per year, 33.3% take between three and four field trips annually, and 12.1% take more than five trips during the school year. A major component of the environmental science course is a field component that requires extensive use of the outdoor environment to complete selected topics. With 7.6% of teachers never taking field trips and 47.0% only taking one to two field trips annually, it is evident that many teachers are not fulfilling the course requirements in the area of field studies for environmental science.

Table 14 shows the results for chemistry. Here it is evident that no chemistry teacher in the province completes more than four field trips in a year. Over half, 58.1% never take their classes on field trips, 40.5% take between one and two trips per year and 1.4% take between three and four field trips during the school year. The course requirements for teaching chemistry does not specify the need to take students on field trips. Many teachers who did not plan and carry out field trips in chemistry indicated that they did not feel the topics in chemistry could be field-based. In contrast, the chemistry teachers who did carry out regular field trips, thought there were many areas in chemistry that could be better dealt with in the field.

These results from Table 15 on earth science, indicate that 29.2% of Earth Science teachers never take their students on field trips during instruction throughout the school year. Over half, 54.2%, take only one or two trips each year and 16.7% take them over three times each year. The earth science curriculum guide from the Department of Education (1983) indicates that " Field trips should be a normal part of a students' earth science experience" (p. 15). Everywhere in this province there are many earth science features which may be studied first hand, such as erosion, weather, glacial history, fossils, land forms and bed rock features. Field trips in earth science help students internalize their new experience as part of their self concept and life experience. Many of the abstractions of earth science have some of the preliminary concrete bases available for study through field trips. Models are often constructed on the basis of observable field phenomena (Department of Education, 1983). When we realize that field trips in earth science are expected it is disturbing to find that 29.2% never take their students on field trips to expand the ideas studied in class.

Table 16 shows the results for geology. Here 20.0% of teachers who teach geology never take their classes outside the boundaries of the classroom to field sites, 48.0% take them out only one to two times per year, 20.0% take their students outside between three to four times and only 12.0% take their students outside the classroom more than five times. The geology curriculum guide from the Department of Education (1985) states that "an aesthetic appreciation of geology is developed through the examination of mineral crystals, landforms, and earth processes, out-of-doors and in the classroom" (p. 3). It further indicates that field trips should be integral part of all students' geology experience. In general, the earth science and geology curriculum strongly recommends the use of field trips in achieving program objectives. Both these courses include topics that should be covered in the field setting. With 29.2% of earth science teachers and 20.0% of geology teachers never taking field trips, it is evident that many students never get a hands-on approach to the topics in earth science and geology.

These results for physics are included in Table 17. The data here indicates a high percentage, 57.8%, of teachers who teach physics do not include field studies as a component in their instruction, 34.9% of respondents took between one and two field trips and 7.2% took more than three field trips per year.

Results from Table 18, indicate that most teachers, 53.1%, never take their students out on field trips, 28.1% take part in field trips either one or two times throughout the year and only 18.7% take their students on field excursions more than three times during the course of the school year. Many physical science and physics teachers indicated that these curriculum areas do not reflect areas where field studies could be used. A review of literature on field trips showed that there are a wide range of field possibilities in these areas. Therefore, it seems that many teachers are not aware of the different types of field activities that are available.

In reference to the research question it is evident that the majority of field trips are in the areas of the grade seven science program and in environmental science. The courses with the least exposure to the field experience are physics and physical science. In most areas, the number of field trips actually taken was far less than what was expected. It is hoped that subsequent sections will address some of the concerns in this particular area of the science curriculum.

Table 12

Frequency Distribution Of The Number Of Field Trips Taken For Biology Classes In One Year

Value	Frequency	Percent
Never	23	19.8
1-2	71	61.2
3-4	19	16.4
5-7	3	2.6
8-10	0	0
10+	0	0
Respondents not teaching Biology	140	
Total	256	100

Table 13

Frequency Distribution For The Number Of Field Trips Taken For Environmental Science In One Year

Value	Frequency	Percent
Never	5	7.6
1-2	31	47.0
3-4	22	33.3
5-7	4	6.1
8-10	1	1.5
10+	3	4.5
Respondents not teaching Environmental Science	190	
Total	256	100

Table 14

Frequency Distribution For The Number Of Field Trips Taken For Chemistry In One Year

Value	Frequency	Percent
Never	43	58.1
1-2	30	50.5
3-4	1	1.4
5-7	0	0
8-10	0	0
10+	0	0
Respondents not teaching Chemistry	182	
Total	256	100

Table 15

<u>Frequency Distribution For The Number Of Field Trips Taken For Earth Science In One Year</u>

Value	Frequency	Percent
Never	7	29.2
1-2	13	54.2
3-4	2	8.3
5-7	1	4.2
8-10	0	0
10+	1	4.2
Respondents not teaching Earth Science	232	
Total	256	100

Table 16

Frequency Distribution For The Number Of Field Trips Taken For Geology In One Year

Value	Frequency	Percent
Never	5	20.0
1-2	12	48.0
3-4	5	20.0
5-7	2	8.0
8-10	1	4.0
10+	0	0
Respondents not teaching Geology	231	
Total	256	100

Table 17

Frequency Distribution For The Number Of Field Trips Taken For Physics In One Year

Value	Frequency	Percent
Never	48	57.8
1-2	29	34.9
3-4	5	6.0
5-7	1	1.2
8-10	0	0
10+	0	0
Respondents not teaching Physics	170	
Total	256	100

Table 18

Frequency Distribution For The Number Of Field Trips Taken For Physical Science In One Year

Value	Frequency	Percent
Never	17	53.1
1-2	9	28.1
3-4	3	9.4
5-7	1	3.1
8-10	1	3.1
10+	1	3.1
Respondents not teaching Physical Science	224	
Total	256	100

Research Question #2: What is the extent of use of the outdoors for classroom science instructional activities?

This research question was also expressed in the same form on the questionnaire as was the first research question. Specifically, the questic asked teachers: "How many times in each subject area you teach, do you take your classes on field trips for activities?"

For this research question the average percentages were calculated for each of the six values given on the table across all curriculum areas.

Table 19 is an average of people and therefore does not represent everyone since some areas indicated high levels of field trip use and some areas indicated only minimal use. The table was only included to give a broad overview of the extent of the use of field trips across the science curriculum.

These results indicate most respondents, 47.4%, take their students on between one and two field trips per year. It is worthwhile to note that 29.7% never take students on field studies for activities. It is promising that teachers have not abandoned the field experience in their instruction, they seem to be including them even with budgetary constraints and so on.

Table 19

Average Percentages Of All Curriculum Areas For The Number Of Field Trips

Value	Average Percent
Never	29.7
1-2	47.4
3-4	15.0
5-7	4.04
8-10	2.04
10+	1.85

Research Question #3: What are the critical factors limiting the use of the field trip for science education?

The specific question on the questionnaire stated: "What factors limit or restrict your use of field trips in science at your school?" On the questionnaire teachers were asked to rate eighteen responses as being not important = 1, somewhat important=2, important=3, and very important=4. Table 20 lists all the responses and the respective means for each statement.

From Table 20 it is evident that over 50% of teachers listed eight of the 18 statements as not important as a restriction to the use of field trips in the teaching of science. Specifically, the factors cited as either not important or somewhat important were: personal objections to field trips, objections and lack of support from administrators, too much preparation involved, students not interested, student discipline is a problem, not enough training in field trips, weather/climate in our province is a concern, and liability of the teacher.

Factors that teachers did see as major impediments to their use of field trips in the curriculum were: financing the travel, lack of funding, length of class time, and class scheduling problems. Other limiting factors that were seen as somewhat important were: too rigid curriculum requirements for courses, lack of resource material, lack of resource people for assistance, classes too large, few local sites of interest and safety considerations. Also, while teachers don't mention lack of competence directly, several of these factors do imply that teachers are not as competent as we might wish.

Some respondents listed other factors: public exam course preparation time and the subject material not appropriate to teaching in the field setting as factors which limit their use of the field trip for science instruction.

Research Question #4: What has been the main source of preparation for science teachers (B.Sc. or B.Ed. Programs) in using the field trip experience?

The specific question on the survey instrument asked respondents, "What has been most useful in your preparation for conducting science activities involving the use of field trips?" Table 21 shows that the majority of respondents, 63.7%, said they were self taught, 17.5% responded with courses in the B.Sc. program, 6.6% responded with courses in the B.Ed. program, 8.0% responded they felt inservice or workshops were most useful to them in preparation for using field trips in their instruction. Only, 4.2% listed other sources such as fellow-teachers.

Research Question #5: Are university programs preparing science teachers to be confident outdoor educators?

A number of items on the questionnaire dealt with this research question both directly and indirectly. One item on the questionnaire asked respondents to rank the statement "Not enough training in field trips" in terms of its effect on limiting or restricting the use of field trips in science. Over half of the respondents, 53.5% , indicated that it was not important in limiting the use of field trips. Only 19.7% indicated that is was either important or very important in affecting the use of field trips. Respondents attitude toward their undergraduate degree programs was expressed in an item that asked them to state whether they disagreed = 1 or agreed = 2 with the statement "My university undergraduate degree program, prepared me to conduct meaningful field trips in science". A large percentage, 71.7%, disagreed with this statement and 28.3% agreed. The negative statement of the above, "My university undergraduate degree program did not prepare me to conduct meaningful field trips", resulted in 35.2% in disagreement and 64.8% in agreement. Both of these indicate that respondents felt that their university programs did not prepare them to lead field trips. Respondents were asked to rate certain items as either not important=1, somewhat important=2, important=3 and very important=4 in its importance in improving and increasing the use of field trips in science teaching. The specific item asked if "More preparation for outdoor teaching in university undergraduate classes" would be important in improving and increasing the use of field trips in science teaching. A large percentage, 81.8%, indicated that this was either important or very important in improving and increasing the use of field trips in science teaching. The final item that dealt with this research question was an item where respondents were asked to choose what programs prepare them for conducting science activities involving field trips. Only 17.5% respondents indicated the

Bachelor of Science program was most useful and 6.6% indicted the Bachelor of Education program was most useful.

Research Question #6: What sites are being used as field sites by science teachers?

This research question involved two items from the questionnaire. Specifically those surveyed were asked, "When conducting field trips, which type of site do you use more frequently?" Of teachers responding to this item, 21.3% never use the school grounds, 14.6% never use sites adjacent to the school grounds, 21.2% never use community grounds, 51.9% never use the provincial lands-parks and 71.5% never use an established outdoor laboratory area. The most popular area, with 48.7% of respondents using the area either often or very often was, the area near school grounds. Another popular area, with 38.5% respondents using the area, was community grounds.

Another item from the questionnaire that corresponds to this research question asked teachers to rate different specific field sites in terms of how often they use them with their classes. Fourteen different responses were given. Respondents were asked to rate them in terms of how often they were used.

The most popular field site which was used often or very often was marshes and bog with 31.7% of respondents in agreement. The next most popular sites with 29.4% and 29.2% were the pond-lake site and the forest site, respectively. The stream-river site and the seashore were also popular, with 28.0% and 28.7%, respectively, of respondents using these sites often or very often. The sites that were used most infrequently were the empty lot with 95.7%, the waste dump with 94.3%, the museum with 93.4%, the slope site with 92.1%, the industrial site with 86.4%, the ocean with 85.4% and the roadside site with 83.7% of the respondents never or sometimes using this site. Table 22 gives a list of all sites with the percent using each often or very often.

One very interesting feature about these responses is the low percentage of teachers who use the ocean as a field site. This is a very surprising result given that a vast number of communities in Newfoundland have the ocean on their doorstep.

Research Question #7: How far are these field sites from the school building?

The item on the questionnaire that reflected this research question specifically asked respondents to indicate how far the field trip sites they use were away from the school. Table 23 shows the frequency of response and the percentages for different distances.

These results indicate that the most popular site for field studies used by the respondents was the site within walking distance from the school. Over half of the respondents, 51.2, indicated that this was the preferred site for their trip. Only 29.3%, journeyed more than 5 km from the school.

Table 20

Factors Which Influence The Use Of Field Trips By Respondents

Factors	Mean	S.D.
Student discipline is a problem	1.577	.868
Classes are too large	2.147	1.118
Few local sites of interest	2.147	1.065
Liability of the teacher	1.906	.988
Class scheduling problems	2.694	1.123
Students are not interested	1.500	.755
Not enough training in field trips	1.728	.929
Personal objections to field trips	1.209	.556
Lack of resource people for assistance	2.115	1.042
Weather/climate in our province is a concern	1.898	.954
Too much preparation involved	1.492	.758
Objections and lack of support from administrators	1.433	.745
Financing the travel	2.851	1.109
Too rigid curriculum requirements for courses	2.221	1.105
Length of class time	2.750	1.103
Lack of resource material	2.202	1.046
Safety considerations	2.114	.938
Lack of funding	2.793	1.098

Table 21

Frequency Distribution For Factors That Are Most Useful In Preparing Teachers For Conducting Science Activities Involving The Use Of Field Trips

Value	Frequency	Percent
Courses in the B.Sc. Program	37	17.5
Courses in the B.Ed. Program	14	6.6
Inservice or Workshops	17	8.0
Self-Taught	135	63.7
Other	9	4.2

Table 22

Frequency Of Field Sites Used By Respondents

Field Site	Percent Using Often Or Very Often
Forest	29.2
Meadows	19.6
Stream/River	28.0
Roadside	16.4
Pond/Lake	29.4
Seashore	28.7
Ocean	14.7
Slopes	7.9
Museum	6.6
Industrial Site	13.6
Waste Dump	5.9
Marshes/Bog	31.7
Fossil Bed	8.0
Empty Lot	4.2

Table 23

Distance Of Field Trip Sites From The School Building

Distance	Frequency	%
Within walking distance	110	51.2
1-5 km from the school	42	19.5
5-10 km	31	14.4
More than 10 km	32	14.9
Missing	41	
Total	256	100

Research Question #8: What is the typical length of field trips conducted by teachers?

The specific item on the questionnaire asked respondents to indicate the typical length of one of their field trips during a school year. Table 24 gives the frequency and percent of each response.

Table 24 shows that the majority of field trips taken are only one class period in length. Also popular were field trips that were either two class periods or one-half day in duration. The least popular were field trips that were less than one class period or were a full day or more than one day in length.

Research Question #9: What type of resources do teachers use when planning field trip activities?

This research item was dealt with specifically on the questionnaire by asking respondents how often they use different sources when conducting field trip activities. Table 25 gives the percentage of respondents using the different resources either often or very often when conducting field trips.

The results indicate that most respondents use their own materials when planning field trip activities. Two other resources that are popular with respondents are textbook activities and resource pamphlets and/or books. The least popular responses were using other resource people; either from the community or from parks and so on.

Table 24

Typical Length Of Field Trips By Respondents In One Year

Distance	Frequency	%
Less than one class period	8	3.6
One class period	73	32.9
Two class periods	60	27.0
Half a day	55	24.8
Full day	25	11.3
More than one day	1	0.5

Table 25

Types Of Resources Used By Teachers In Planning Field Trip Activities

Type of Resource	Percent Using Often/Very Often
Resource people from the community	28.2
Textbook activities	46.1
Resource pamphlets and/or books	35.2
Self-generated materials	49.0
University course/text material	21.7
Resource people from parks and so on	27.2

Research Question #10: What opinions do teachers have concerning the use of field trips in the Science Curriculum?

For this item on the questionnaire, specific statements were given and the respondents asked if they agreed or disagreed with each statement. The statements that were agreed upon by the majority of the respondents are included in Table 26.

It is evident from these results that teachers are in agreement to the use of field trips as classroom and laboratory aids in teaching science, and the majority feel they are both necessary and important. Field trips are encouraged by the administrators of the schools, with 64.8% of respondents in agreement. Most teachers, 64.5%, feel that areas near the school are good for science field studies because students are familiar with them. The majority of respondents, 64.8%, felt that their university degree program did not prepare them to conduct meaningful field trips. Most respondents, 52.2%, agreed, that the school science curriculum mandates or strongly recommends the use of field trips in teaching science.

These results are not surprising given the responses in Table 27 in which respondents disagreed. Respondents disagreed that there are no areas of interest near our school where field studies can be carried out, in other words they feel strongly that there are areas of interest near the school where field studies can be carried out.

Table 26

Statements Showing A High Percentage Of Respondents In Agreement

Value	Frequency	Percent
The use of field trips as classroom and laboratory aids in teaching science is necessary	221	88.8
The use of field trips as classroom and laboratory aids in teaching science is important	240	94.9
Areas near the school are good for science field studies because students are familiar with them	160	64.5
Field trips in science are encouraged by the administration of my school	160	64.8
My university undergraduate degree program did not prepare me to conduct meaningful field trips	162	64.8
The school science curriculum mandates or strongly recommends the use of field trips in teaching science	130	52.2

Table 27

Statements Showing A High Percentage Of Respondents In Disagreement

Value	Frequency	Percent
My university undergraduate degree program prepared me to conduct meaningful field trips in Science	180	71.7
Science field trips are not worth the preparation time	229	91.2
The field trip is a waste of instructional time	231	91.3
There are no areas of interest near our school where field studies can be carried out	213	84.2
There is a field site on or near the school grounds regularly used for field studies	148	58.7
The use of field trips are not encouraged by the administration of my school	175	70.9
The use of field trips is not recommended in our school science curriculum	202	82.1
The areas surrounding the school are not good field study sites	185	73.7

Research Question #11: How do teachers perceive their local school administrators support of field trips?

The results indicate that, 64.8% of the respondents, are in agreement with the statement that field trips in science are encouraged by the administration of my school. The negative statement showed that 70.9% were in disagreement with the statement that "The use of field trips are not encouraged by the administration of my school". These results show the majority of respondents felt that their administrators supported the use of field trips in the science curriculum. These results are also consistent with the results for Question #3, where respondents indicated that objections and lack of support from administrators was not important as a restriction to the use of field trips in science.

Research Question #12: What suggestions do teachers have for improving the use of outdoor science teaching?

The specific question on the questionnaire gave teachers a list of possible measures that could be put into place to improve the use of the outdoors in science teaching. The most popular measures are included in Table 28 with their respective frequencies and percentages.

Respondents felt the two most important factors to improve and increase the use of field trips in science teaching are inservice and workshops for science teachers on how to effectively design field trips and inservice and workshops on how to

Table 28

Statements Respondents Indicated That Could Be Very Important Or Important In Order To Improve And Increase The Use Of Field Trips In Science Teaching

Value	Frequency	Percent
Require teachers to take a field-oriented science course	188	74.6
Special regional materials designed for your particular area	217	85.8
More preparation for outdoor teaching in university undergraduate classes	207	81.8
Local resource guides to direct teachers to the resources needed for a particular science field trip	205	81.4
Inform non-science teachers and administrators of the benefits of outdoor education	209	82.9
Inservice and workshops for science teachers on how to effectively design field trips	234	92.5

(table continued)

Value	Frequency	Percent
Inservice and workshops for science teachers on how to effectively use their local resources	231	91.3
Departmental guidelines and requirements in field studies	180	71.1
More use of specialists, such as park rangers, in guide field studies	181	72.1
Development of a natural area or outside laboratory near your school	147	58.1
Improvement of class scheduling	160	63.3
More science preparation time	205	81.0
Environmental centres with trained guides	168	66.4
Required field trips in the elementary grades	172	68.8
Specific field-oriented course in the secondary school curriculum	166	66.7

Table 29

Results Of The Importance Of Different Field Study Activities Held By Respondents

Value	Frequency	Percent
Collecting specimens such as flowers and so on	167	66.8
Collection and identification of flora and fauna in your area	176	70.7
Determination of local polluters in your area	213	84.2
Study of wildlife habitats	214	84.9
Study of local waste disposal and landfills	192	75.9
Study of natural preserved area	183	72.9
Visits to and the study of industries that have a significant impact on the local environment	202	81.2
Study and tour of provincial parks	145	58.3
Study and tour outside laboratories such as the Marine Centre at Logy Bay	176	72.1

(table continued)

Value	Frequency	Percent
Weather studies such as atmospheric pressure	146	57.9
Study of the organisms and environmental conditions of local lakes and ponds	212	84.1
Orienteering activities such as the use of the compass	176	70.1
Study of the aquaculture or agriculture in your area	184	73.3
Forest management studies	196	77.5
Adaptations of organisms in winter climates	154	61.1
Geological study of land development	156	62.1
Study of water treatments and pollutants	194	76.6
Study of plant succession	186	74.1

(table continued)

Value	Frequency	Percent
Study of agricultural practices such as soil conservation	173	68.7
Study of alternate energy uses	200	80.3
Study of ecological relationships, ie. adaptations of organisms in tidal zones	178	70.9
Collection and study of fossils	146	58.1

effectively use their local resources. Other popular suggestions were special regional materials designed for your particular area, inform non-science teachers and administrators of the benefits of outdoor education, more preparation for outdoor teaching in university undergraduate classes, local resource guides to direct teachers to the resources needed for a particular science field trip and more science preparation time.

Research Question #13: What types of activities, do teachers feel, should be included in an outdoor science curriculum?

The specific item on the questionnaire gave respondents a list of possible kinds of field studies in science and respondents were asked to rate each whether they were very important, important, somewhat important or not important in the science curriculum. Table 29 lists all the possible types of field studies and includes the frequency of respondents who thought these field activities were either important or very important in the science curriculum.

Chapter Summary

It is evident from these results that activities with an environmental focus seem to be most popular with teachers. Specifically, determination of local polluters in your area, study of wildlife habitats, visits to and the study of industries that have a significant impact on the local environment, study of the organisms and environmental conditions of local lakes and ponds, study of alternate energy uses, study of water treatments and pollutants, forest management studies and the study of local waste disposal and landfills were seen as important to very important in an outdoor science curriculum.

The data collected is very comprehensive and informative. From this tremendous amount of information a number of issues concerning the status of field studies in the present science curriculum can be addressed. The following chapter will discuss the results of the survey. From this data, a number of general conclusions concerning field studies will be made. Based on these conclusions, the researcher will make recommendations to improve the use of field studies in the intermediate and senior high curriculum. These recommendations will, hopefully, help curriculum planners, administrators and the classroom teacher in the area of field studies.

CHAPTER FIVE

Conclusions and Recommendations

This chapter will give an overview of the research carried out. The overall results are discussed. Conclusions will be drawn and recommendations made in reference to the results obtained from this research.

Discussion

It is difficult to obtain a high percentage of return in a provincial mailing of questionnaires. Less than 50% is typical. Follow-up questionnaires to nonrespondents may increase the percentage but also increase the cost of the survey. Though the return was satisfactory for this study, there always remains the uncertainty of how the results would have changed if all subjects had responded. The importance of the nonrespondents relates to the nature of the information solicited. It has been found that nonrespondents tend to have achieved less academic success than respondents and that persons having good programs are more likely to respond than persons having poor programs (Borg & Gall, 1981). These factors may suggest that the nonrespondents, had they answered, would skew the results to show less use of outdoor resources than the sample indicated. If we assume that the respondents are generally more active outdoor educators and enjoy more academic success, then the information obtained from the survey presents an overly optimistic view. Much of the information requested, concerned the teachers' on-going programs and their preferences and ideas concerning increasing and improving outdoor activities. Responses from inactive, inexperienced, or incapable teachers may have contributed little to many aspects of the study.

Respondents' enthusiasm for the survey was very encouraging. Many wrote comments concerning shortcomings in outdoor natural science teaching or described the successes of their programs. A large percentage, 88.8%, of teachers thought the use of field trips as classroom and laboratory aids in teaching science is necessary and 94.9% of teachers felt the use of field trips as classroom and laboratory aids in teaching science is important. This in indicative of a strongly held belief in using outdoor science.

Conclusions

From the data obtained a number of generalizations can be made. These generalizations will be presented in this section and then discussed in reference to on-going and future considerations in science education.

1. The majority of field trips in junior high science are completed by grade seven science teachers with only 7.1% never taking any field trips during a school year. Almost half the respondents, 48.6% take between one to two trips per year and 24.3% take between three to four trips per year. Only a small percentage, 11.4%, take between five and seven trips and 8.6% take over eight trips per year.

The grade nine science program had the least number of field trips with 29.3% of grade nine science teachers never going to the field for activities. It is important to note here that curriculum requirements in some areas do not mandate the use of field trips for instructional purposes. For example, the grade seven program strongly recommends the use of field trips for instruction and the nature of the topics covered demand that teachers take their students on field trips for a large number of environment-related activities. This is not the case for the grade eight and grade nine science programs. Even when field trips are not required for the course, many teachers still make an effort to take their students to the field for instruction.

The majority of field trips taken in senior high are in environmental science. Here, only 7.6% of respondents, never take part in field trips, 47% take between one and two trips per year, 33.3% take three to four, 6.1% take five to seven, and 6.0% taking more than eight trips per year. This course is a basic course which has a major field study component. It is surprising that even 7.6% of environmental science teachers do not take their classes to the outdoors for activities. Environmental science is not a required science in our secondary school curriculum and therefore cannot be expected to affect the outdoor science education of the majority of secondary science students. The course in the senior high program with the least number of field trips was chemistry, with 57.8% of chemistry teachers not entering the outdoors for any science related activities. Many chemistry and physics teachers indicated that the reason they do not include field trips as part of the overall curriculum component in their respective areas is because the nature of the material being covered does not lend itself to field trip use. Although these teachers were not actively using field trips for instruction, they indicated a very positive attitude toward them. This seems to indicate that if they had proper instructional packages available to them for their specific curriculum areas they would make use of them.

One surprising result in the analysis, was the large percentages of teachers in the biology, earth science, and geology areas who never take field trips. Field trips are strongly recommended in these areas. There may be many factors that may contribute to this lack of field trip use.

2. The most important factor seen by teachers as limiting or restricting the use of field trips in teaching science was financing the travel, specifically bus travel. This was expected since many schools and school boards in the province are struggling to provide basic instructional materials. With provincial budgetary restraints as they are, many schools are even forced to do local fund-raising to provide travel and needed materials. This is not, however, consistent with the answers given by teachers to research item six. Here, 21% of teachers said that they never use school grounds. Many worthwhile field activities can be conducted on school grounds or within walking distance from it. Teachers without training or knowledge about the preparation and use of field trips may mistake costly travel as a necessary prerequisite for field trips. Other important factors included: lack of funding for desired materials, length of class time, class scheduling problems, too

rigid curriculum requirements for courses, lack of resource material, classes too large, and few local sites of interest. All these factors are controlled by the Provincial Government, the Department of Education, the Local School Board Committees and then by the local school administrators and therefore out of the classroom teachers control. The statement "personal objections to field trips" was rated very low as a factor contributing to the restriction of using field trips in science instruction. This indicates that if the other major factors were not a hinderance then teachers would do more in this area. Even though the average percentage of respondents not taking their classes on any field trips was 29.7%, they believe that outdoor science field trips are important. Evidently most do not remain indoors because of personal objections to field trips.

3. The most important factor which can contribute to improving and increasing the use of field trips in science teaching is inservice and workshops for science teachers on how to effectively design field trips. This approach seems to work. In New Jersey, Garella (1976) compared a control group with teachers who had attended a resource guide development workshop wherein they received training in inventory, developing, and using strategies for the study of selected resources. The control group only received the developed guide to the resources. The experimental group showed significantly increased knowledge of the resources and made more use of them. The study by Welke (1980) of participants and non-participants in a workshop designed to instruct teachers in the use of outdoor resources with students

showed similar results. Other factors seen as important in improving or increasing the use of field trips in science were: (a) special regional materials designed for your particular area; (b) inform non-science teachers and administrators of the benefits of outdoor education; and (c) more preparation for outdoor teaching in university undergraduate classes. All these areas can be encouraged and some easily enforced. For example, Meades (1991) completed a comprehensive report to describe the natural regions of Newfoundland and Labrador for the Protected Areas Association. This massive resource could be used, as a base, to develop local materials for use when conducting field trips. Teachers indicated that their undergraduate university degree programs were lacking in terms of preparing them to be confident outdoor educators.

4. Less than 25% (24.1%) of the teachers listed university programs as their main preparation for conducting science activities involving the use of field trips. The majority, 63.7%, indicated that they were "self-taught" in the use of field trips in the science curriculum. The statement, "My university undergraduate degree program, prepared me to conduct meaningful field trips in science", revealed that most teachers were in disagreement with this statement. This indicates that the undergraduate degree programs in science and education do not prepare teachers to conduct meaningful field trips in science. When asked to rate items on their importance in improving and increasing the use of field trips in science teaching, one statement, "More preparation for outdoor teaching in university undergraduate

classes" was rated as very important. This indicates that respondents felt there should be more preparation in university classes in respect to field trips in science. This was not, however, a major factor in restricting or limiting the use of field trips in teaching science.

5. The majority of field trips take place on or near school grounds and 51.2% take place within walking distance from the school. The majority are one-class long (32.9%) or two class periods (27.0%). The most visited site for activities are marshes and bog land. Other more common sites include the forest, pond or lake and stream or river. No sites were rated as being used "very often" but the above four sites saw much more use than the others. This seems to indicate that most teachers prefer field trips close to the school, for short periods of time to study common local ecosystems. Local materials should be developed with this focus.

6. Respondents were positive about the importance and necessity of using field trips as classroom and laboratory aids in teaching science. They also felt that areas near the school are good for science field studies because students are familiar with them. They also felt that field trips are encouraged by the administration of the school. They also felt that their university degree program did not prepare them to conduct meaningful field trips. They also agreed with the statement "the school science curriculum mandates or strongly recommends the use of field trips in teaching science". Respondents disagreed with the statement "Science field trips are

not worth the preparation time" and the statement "The field trip is a waste of instructional time".

7. The outdoor science activities and studies that were rated by the respondents for their importance to the science curriculum were taken from many sources. A concern for environmental quality and awareness surfaced in the results. The eight most highly rated field studies were determination of local polluters in your area, study of wildlife habitats, visits to and the study of industries that have a significant impact on the local environment, study of the organisms and environmental conditions of local lakes and ponds, study of alternate energy uses, study of local waste disposal and landfills, forest management studies, and study of water treatment and pollutants. These areas should also be taken into account when developing local resources in science.

Recommendations

The author's research on the use of field studies indicate that the most important impediments to field trips, as seen by teachers, are: class scheduling problems, financing the travel, length of class time, and lack of funding. It also indicates that science teachers realize the importance of direct learning experiences in the outdoors for their students in science teaching. Since 51.2% of the outdoor science that is carried on is within walking distance from the schools, and 48.7% use school grounds it is apparent that teachers appear to be working within the constraints as they see them. The obstacles of lack of funding and class size translate to money, and the status of outdoor science is prioritized by those who govern the schools. The following list specifies different curriculum and logistical considerations that are recommended in order to improve the use of field activities in teaching science:

1. Scheduling time for outdoor science and the length of class time does not necessarily relate to dollars, but to improve it must be seen as important by administrators and school officials, not just the science teachers. Since the majority of teachers indicated that their local school administrators are positive about including field trips in the curriculum, they probably only have to be made aware of the necessity of providing double periods for science in the curriculum and provide support for teachers, by possibly filling in with other classes, when the science teacher is conducting a field excursion.

2. Since most of the outdoor science goes on in the vicinity of the school it would be beneficial if school districts could provide school-based nature study sites or outdoor science laboratories. This site cannot provide all the requirements of all programs but could be developed around the specific needs of the school's science program. It can contain most of the plant species and ultimately many of the animal species native to the locality. It can have a pond, ecotones, transplanted rock strata to represent the underlying geological history of the region, and a deep trench to show soil horizons and soil formation.

Activities for the site can be designed to be concluded in one period or at least be suspended without disrupting the continuity of the activity.

3. The nature study site should have the support of the local school board and the school's administration since it minimizes transportation of students and the attendant risk of accidents and lawsuits. If this nature study site is properly designed, it can also enhance the school's landscape. But to receive regular use it must be adjacent to the school to prevent disruption of class schedules.

4. Another area where science teachers and those who train science teachers may begin immediate improvement in the use of field trips in science is in making sure that each teacher has a portfolio of meaningful outdoor science activities for his or her students. Local regional materials need to be developed which include information about a region's biota, geology, and so on. Since most respondents indicated that the areas used most for field trip activities included, marshes/bog, pond/lake, stream/river, and the forest site, special specific field studies to these areas should be developed. Since most resources are generated by teachers it would be productive to have some means whereby teachers could exchange ideas or get together to plan strategies. When respondents were asked to rate different types of activities for their value as field trip activities, the activities with the highest rating were directly related to environmental awareness issues. The type of activities include: determination of local polluters in your area, study of waste disposal and landfills, visits to and the study of industries that have a significant impact on the

local environment, study of the organisms and environmental conditions of local lakes and ponds, study of water treatment and pollutants, study of alternate energy uses, forest management studies and a study of wildlife habitats. Curriculum planners and textbook writers should include these activities and be aware of them when making science curriculum decisions. Since few field trip activities take place in the physical sciences, special activities should be designed for these programs and a portfolio of existing activities be made available to teachers.

5. University programs should include "how to" demonstrations as well as practicum exercises wherein teacher-trainees use activities and labs that directly involve them with the outdoors, students, and instruction. How does a class of level one students study the ecology of a pond? How does a class use a road-cut to examine the geological history of the area? How can a biology class compare the differing biota of different regions? These kinds of studies require knowledge of local natural science in combination with teaching skills, techniques, and experience. The university undergraduate degree program should include mandatory field trips in all relevant areas and include planning strategies in the science education methods courses to better prepare teachers to conduct field trips in their respective curriculum areas.

6. Inservice programs need to be developed to show teachers how to effectively use field trips. These inservice programs also should show teachers how

to effectively design there own local materials, so they can make the best use of their instruction in the field.

7. Notwithstanding the shortage of funds and disruption of schedules, school administrators and school boards must know that science classes need outdoor resources. School administrators and science teachers should map out the important resources within a reasonable distance of the school - polluted streams, ponds, marshes, seashore, and so on - where the science curriculum can be enriched. Field trips beyond the school need not be many but they must be worthwhile. They require meticulous planning. Proper training of science teachers in the use of local resources will assure that from the time students leave the classroom, they will know why, where, and how they are to participate in the activity. Science teachers must win support for outdoor science activities by convincing their respective school boards that the benefits outweigh the costs and risks. This may not be easy. It seems that a return to the basics in science teaching means direct involvement with the phenomena of science, which are mostly outdoors.

Recommendations for Further Research

Research in the area of scientific field trips should be an ongoing endeavour by researchers in science education. Research should continue on the effect of the use of field trips on students cognitive and affective domains. Further studies should be done to determine how teacher education and training in the use of field trips affect their use and attitude toward them as instructional methods. Studies should be done to compare teacher background with the extent of field trip use. A study should be done to determine if teachers with major university course work in field trips use them more frequently than other teachers with less formal training.

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APPENDIX A

Letter to Superintendents/School Boards

64 Amhearst Heights
St. John's, NF
A1E 3J4

April 11, 1992

Dear Sir/Madame:

I am a Graduate student in the Science Curriculum and Instruction Masters Program at Memorial University and am currently doing my thesis work on The Status of Outdoor Field Studies in the Newfoundland Science Curriculum.

The instrument to be used is a survey/questionnaire that will assess the use of field studies and will look for suggestions from Science Teachers on how to improve this critical area of environmental education. The projected date on which the questionnaires will be mailed is May 1, 1992.

I request your assistance and permission to carry out this study. Enclosed is a form where you may indicate whether or not I have your permission to administer the questionnaire to a random sample of intermediate and secondary school science teachers within your board. I also request at this time the names and addresses of the junior high and high schools in your district, the school populations, and a list of the intermediate and secondary science teachers within each of the schools.

This information may be mailed to me at the address above or you may use the following fax number: 279-4655. Should you have any questions related to this study, please feel free to contact me at 745-8252 or 279-3759. I thank-you for your kind consideration of this matter.

Sincerely yours,

Lynn FitzPatrick-Antle

INFORMATION FORM

Superintendent: ________________________________

School Board: ________________________________

This school board DOES/DOES NOT permit this questionnaire to be administered to the teachers of intermediate and secondary school science within this board.

SCHOOL/ADDRESS	SCIENCE TEACHER(S)	APPROX. SCHOOL POP.

APPENDIX B

Letter to Teachers
and Questionnaire/Survey Instrument

64 Amherst Heights
St. John's, NF.
May 20, 1992

Dear Fellow Science Teacher:

On the back of this questionnaire you will find a tea bag. When you have a few minutes, go to the staffroom, plug in the kettle and make yourself a cup of tea.

Hi! My name is Lynn FitzPatrick-Antle and I am a graduate student in Curriculum and Instruction at Memorial University. I am currently doing my thesis work in the area of Field Studies/Field Trips in Science Education. It would be much appreciated if you would take 10 minutes from your busy schedule and complete the attached questionnaire/survey that has been approved for use by your Superintendent.

The purpose of this study is to determine the extent of use of field trips, the restrictions that exist, and suggestions from you on how to improve its use in the present Science Curriculum.

The return of your questionnaire will indicate your consent to my using the data for my research. At no point are you required to give your name or any other information that might identify you. I assure you that the derived information will be used with complete anonymity.

Please return the completed questionnaire on or before June 13, 1992 in the pre-stamped envelope provided, since the results are needed for analysis during the summer session.

I realize that this time of year is a really busy and hectic time for you but I certainly would appreciate your assistance in this study.

Have a wonderful, well deserved, summer vacation.

Yours truly,

Lynn FitzPatrick-Antle

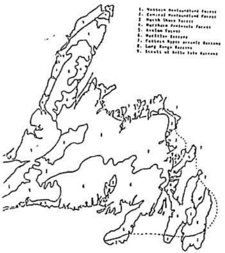
Attach.: Questionnaire

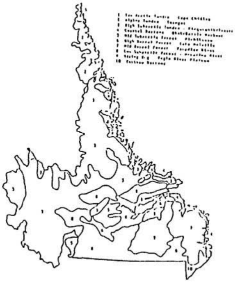
THE INSTRUMENT

Although you are not asked to identify yourself, your cooperation in providing the following information would be most appreciated. It is essential to the study being carried out. Thank-you.

PART A

1. The following map of Newfoundland and Labrador is segmented into particular zones from #1 -#9 on the Island portion of Newfoundland and from #1-#10 on Labrador as follows:





Please indicate whether you live on island Newfoundland or Labrador and which area or zone you live in :

(a) Island (b) Labrador

Zone 1 2 3 4 5 6 7 8 9 10

2. Please indicate your sex.

(a) male (b) female

3. Please indicate in which age group you fall in.

(a) less than or equal to 25
(b) 26-35
(c) 36-45
(d) 46-55
(e) greater than 55

4. Please indicate your number of years of teaching experience (up to and including 1991-1992).

(a) 0-4
(b) 5-9
(c) 10-14
(d) 15-19
(e) 20-24
(d) 25 or more

5. Please indicate your number of years of SCIENCE teaching experience (up to and including 1991-1992).

(a) 0-4
(b) 5-9
(c) 10-14
(d) 15-19
(e) 20-24
(f) 25 or more

6. Please indicate the science course(s) which you are currently teaching.

(a) Junior high science - 7
(b) Junior high science - 8
(c) Junior high science - 9
(d) Biology
(e) Environmental Science
(f) Chemistry
(g) Earth Science
(h) Geology
(i) Physics
(j) Physical Science

7. Please indicate the approximate population of the community in which you teach.

(a) 0 - 1000
(b) 1000 - 5000
(c) 5000 - 10000
(d) 10000 - 20000
(e) greater than 20000

8. **Please indicate the number of university Science credits you have:**

(a) 0 - 5
(b) 5 - 10
(c) 10 - 20
(d) 20 - 40
(e) over 40

PART B

The following items ask for information concerning the extent of use of field trips/field studies in your science classes.

1. **During any typical school year from September to June, how many times in each subject area you teach, do you take your classes on field trips for activities?**

	Never	1-2	3-4	5-7	8-10	10+
Junior High Science - 7						
Junior High Science - 8						
Junior High Science - 9						
Biology						
Environmental Science						
Chemistry						
Earth Science						
Geology						
Physics						
Physical Science						

2. What factors limit or restrict your use of field trips in teaching science at your school?

KEY:
1 = Not Important
2 = Somewhat Important
3 = Important
4 = Very Important

(a)	Student discipline is a problem	1 2 3 4
(b)	Classes are too large	1 2 3 4
(c)	Few local sites of interest	1 2 3 4
(d)	Liability of the teacher	1 2 3 4
(e)	Class scheduling problems	1 2 3 4
(f)	Students are not interested	1 2 3 4
(g)	Not enough training in field trips	1 2 3 4
(h)	Personal objections to field trips	1 2 3 4
(i)	Lack of resource people for assistance	1 2 3 4
(j)	Weather/climate in our province is a concern	1 2 3 4
(k)	Too much preparation involved	1 2 3 4
(l)	Objections and lack of support from administrators	1 2 3 4
(m)	Financing the travel	1 2 3 4
(n)	Too rigid curriculum requirements for courses	1 2 3 4
(o)	Length of class time	1 2 3 4
(p)	Lack of resource material	1 2 3 4
(q)	Safety considerations	1 2 3 4
(r)	Lack of funding	1 2 3 4
(s)	Other (____________________)	1 2 3 4

3. When planning field trip activities, how often do you use the following?

KEY:
1 = Never
2 = Sometimes
3 = Often
4 = Very Often

(a)	Resource people from the community	1 2 3 4
(b)	Textbook activities	1 2 3 4
(c)	Resource pamphlets and/or books	1 2 3 4
(d)	Self-generated materials	1 2 3 4
(e)	University course/text material	1 2 3 4
(f)	Resource people from Parks etc.	1 2 3 4
(g)	Other (____________________)	1 2 3 4

4. **When conducting field trips, which type of site do you use more frequently?**

KEY:
1 = Never
2 = Sometimes
3 = Often
4 = Very Often

(a)	On school grounds	1 2 3 4
(b)	Near school grounds	1 2 3 4
(c)	Community grounds	1 2 3 4
(d)	Provincial lands/Parks	1 2 3 4
(e)	Established outdoor laboratory area (ex-Salmonier Nature Park)	1 2 3 4
(f)	Other (________________________)	1 2 3 4

5. **Please rate each of the following field sites in terms of how often you use them with your classes?**

KEY:
1 = Never
2 = Sometimes
3 = Often
4 = Very Often

(a)	Forest	1 2 3 4
(b)	Meadows	1 2 3 4
(c)	Stream/River	1 2 3 4
(d)	Roadside	1 2 3 4
(e)	Pond/Lake	1 2 3 4
(f)	Seashore	1 2 3 4
(g)	Ocean	1 2 3 4
(h)	Slopes	1 2 3 4
(i)	Museum	1 2 3 4
(j)	Industrial site	1 2 3 4
(k)	Waste dump	1 2 3 4
(l)	Marshes/bog	1 2 3 4
(m)	Fossil bed	1 2 3 4
(n)	Other (________________________)	1 2 3 4

6. **The following items relate to your attitude/feeling about field studies/field trips in science.**

KEY:
1 = Strongly Disagree
2 = Disagree
3 = Strongly Agree
4 = Agree

(a)	The use of field trips as classroom and laboratory aids in teaching science is necessary.	1 2 3 4
(b)	The use of field trips as classroom and laboratory aids in teaching science is important.	1 2 3 4
(c)	My university undergraduate degree program, prepared me to conduct meaningful field trips in science.	1 2 3 4
(d)	Science field trips are not worth the preparation time.	1 2 3 4
(e)	Areas near the school are good for science field studies because students are familiar with them.	1 2 3 4
(f)	The field trip is a waste of instructional time.	1 2 3 4
(g)	There are no areas of interest near our school where field studies can be carried out.	1 2 3 4
(h)	Field trips in science are encouraged by the administration of my school.	1 2 3 4
(i)	My university degree program did not prepare me to conduct meaningful field trips.	1 2 3 4
(j)	The school science curriculum mandates or strongly recommends the use of field trips in teaching science.	1 2 3 4
(k)	There is a field site on or near the school grounds is regularly used for field studies.	1 2 3 4

7. **Please rate each of the items below in terms of its importance in improving and increasing the use of field trips in science teaching.**

KEY:
1 = Not Important
2 = Somewhat Important
3 = Important
4 = Very Important

(a)	Require teachers to take a field-oriented science course.	1 2 3 4
(b)	Special regional materials designed for your particular area.	1 2 3 4
(c)	More preparation for outdoor teaching in university undergraduate classes.	1 2 3 4
(d)	Local resource guides to direct teachers to the resources needed for a particular science field trip.	1 2 3 4
(e)	Inform non-science teachers and administrators of the benefits of outdoor education.	1 2 3 4
(f)	Inservice and workshops for science teachers on how to effectively design field trips.	1 2 3 4
(g)	Inservice and workshops for science teachers on how to effectively use their local resources.	1 2 3 4
(h)	Departmental guidelines and requirements in field studies.	1 2 3 4

(i)	More use of specialists, such as park rangers in guiding field studies.	1 2 3 4
(j)	Development of a natural area or outside laboratory near your school.	1 2 3 4
(k)	Improvement of class scheduling.	1 2 3 4
(l)	More Science preparation time.	1 2 3 4
(m)	Environmental centers with trained guides.	1 2 3 4
(n)	Requires field trips in the elementary grades.	1 2 3 4
(o)	Specific field-oriented course in the secondary school curriculum.	1 2 3 4
(n)	Other (____________________________)	1 2 3 4

8. **The following are various kinds of field studies in science. Please rate each activity in reference to its importance in the science curriculum.**

KEY:
1 = Not Important
2 = Somewhat Important
3 = Important
4 = Very Important

(a)	Collecting specimens such as flowers etc.	1 2 3 4
(b)	Collection and Identification of flora and fauna in your area.	1 2 3 4
(c)	Determination of local polluters in your area.	1 2 3 4
(d)	Study of wildlife habitats.	1 2 3 4
(e)	Study of local waste disposal and landfills.	1 2 3 4
(f)	Study of natural preserved areas.	1 2 3 4
(g)	Visits to and the study of industries that have a significant impact on the local environment.	1 2 3 4
(h)	Study and tour of Provincial parks.	1 2 3 4
(i)	Study and tour outside laboratories such as the Marine Center at Logy Bay.	1 2 3 4
(j)	Weather studies such as atmospheric pressure.	1 2 3 4
(k)	Study of the organisms and environmental conditions of local lakes and ponds.	1 2 3 4
(l)	Orienteering activities such as the use of the compass.	1 2 3 4
(m)	Study of the of aquaculture or agriculture in your area.	1 2 3 4
(n)	Forest management studies.	1 2 3 4
(o)	Adaptations of organisms in winter climates.	1 2 3 4
(p)	Geological study of land development.	1 2 3 4
(q)	Study of water treatment and pollutants.	1 2 3 4
(r)	Study of plant succession.	1 2 3 4
(s)	Study of agricultural practices such as soil conservation.	1 2 3 4
(t)	Study of alternate energy uses.	1 2 3 4
(u)	Study of ecological relationships ex.	1 2 3 4
(v)	Adaptations of organisms in tidal zones.	1 2 3 4
(w)	Collection and study of fossils.	1 2 3 4
(x)	Other (____________________________)	1 2 3 4

9. **What is the typical length of one of your field trips during the school year?**

(a) less than one class period
(b) one class period
(c) two class periods
(d) half a day
(e) full day
(d) more than one day

10. **Generally, how far are the field trip sites you use most frequently, away from your school?**

(a) within walking distance
(b) 1-5 km from the school
(c) 5-10 km from the school
(d) more than 10 km

11. **What has been most useful in your preparation for conducting science activities involving the use of field trips?**

(a) Courses in the B.Sc. program
(b) Courses in the B.Ed. program
(c) Inservice or workshops
(d) Self-taught
(e) Other (______________________________)

Please feel free to use the following space to comment further on field trips/field studies in the Newfoundland Science Curriculum.

Thank-you for completing this survey. I hope you have great summer.

APPENDIX C

Follow-up Letter to Teachers

64 Amhearst Hts.
St. John's, NF.
A1E 3J4
June 14, 1992

Dear Fellow Science Teacher:

Recently you received a Questionnaire/Survey from me on the Status of Field trips/Field studies in the Newfoundland Science Curriculum.

It is hoped this Survey will lead to better resource material and awareness of this important area of Science Education.

Analysis of this Survey will begin shortly. As a Science Teacher, your input will ensure its success.

With this in mind, if you have not already forwarded your survey, would you do so as soon as possible.

Thank-you for your kind consideration of this matter. I wish you a very safe and funfilled Summer vacation.

Your truly,

Lynn FitzPatrick-Antle