A SURVEY OF SCIENCE FAIRS
IN SCHOOL DISTRICT 36 (SURREY)

By

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ABSTRACT

The Surrey School District has sponsored a District elementary schools science fair (grades 4-7) for 21 years and voluntary participation has increased throughout this time. Despite this popularity, no studies have been conducted regarding the science fair. A survey of the elementary schools in the Surrey School District was conducted. The four areas identified for investigation were:

(a) participation in school and district science fairs
(b) organization of school science fairs
(c) relationship between science instruction and science fair participation,
(d) teacher participation in science fairs.

Two questionnaires were developed. One was distributed to all elementary teachers in Surrey and the other was distributed to all elementary principals in Surrey. Response rates were 77% (teacher's questionnaire, n=346) and 88% (principal's questionnaire, n=59).

Data analysis was in the form of frequencies of response expressed in percentages. Some crosstabulatons were calculated.

The major findings of the study were:

(a) most schools (95%) participate in the science fair,

(b) most schools (85%) include primary students in the science fair,

(c) 4 827 intermediate students (83%) completed a science fair project,

(d) all schools encourage public viewing of their science fair,

(e) teachers do not vary their science instructional activities, instructonal materials, or their instructonal time, from the fall to the spring,

(f) teachers provide extra instructional time and extra-curricular time to assist students with preparation of science fair projects,

(g) teachers evaluate science fair product and not the process of completing a science fair project,

(h) most teachers (75%) reported a willingness to attend science fair inservice,

(i) teachers and principals have very similar attitudes toward science fair,

(j) many teachers (n=89) and principals (n=39) made general comments about the science fair.

The study recommends that the Surrey Elementary Schools Science Fair be continued and that further study be conducted regarding the type and amount of assistance that elementary students require to complete a science fair project satisfactorily.

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CHAPTER 1

EXPLANATION OF THE STUDY

1.1 General Problem

School District 36 (Surrey) has sponsored a district elementary schools science fair (grades four to seven) for some twenty years and although school participation in the district science fair is optional, the majority of schools choose to participate. In 1986, 56 schools (95% of those eligible) presented projects at the district science fair making it the largest science fair held by Surrey. Despite the popularity of this science fair, and the many impressions that exist about its value and its positive effects, little systematic information has ever been collected about science fairs in Surrey. A brief review of the literature showed that this situation is typical as very few empirical studies on the topic of science fairs were found but many opinions were expressed.

The need for a comprehensive study of science fairs in Surrey became evident in discussions between the researcher and the Supervisor of Instruction (Curriculum and Instruction), who has responsibility for the science fair. During the time of these discussions, the researcher was the Curriculum Helping Teacher (Science) and had major responsibilities for the organization and support of

science fairs in the Surrey School District. In the discussions, four areas were identified for investigation:

(a) participation in school and district science fairs,

(b) organization of school science fairs,

(c) relationship between science instruction and science fair participation,

(d) teacher participation in science fairs.

Background statistics on student and school participation at the district science fair were available for the last seven years. However, no information was available on the following issues: individual school science fairs, the preparation of students for the science fair, the need for inservice training for teachers, teacher attitudes towards science fair, and finally the science background of teachers whose students participate in science fairs.

Due to the size of the school district and also the large number of teachers and schools involved, questionnaires were chosen as a suitable method of gathering this information for the study. The information gathered through the questionnaires, together with the information made available by the school district, formed the data base for the study.

1.2 Science Fairs in British Columbia and the Surrey School District

Science fairs in B.C. have increased in popularity in the 1980's. Within the Surrey School District, statistics about participation rates are available from 1979 only. Table 2.1 shows the increased number of projects entered in the Surrey School District Elementary Schools Science Fair during the 1980's.

Table 1.1 Projects Entered in the Surrey School District Elementary Schools Science Fair

Total Projects	1980	1981	1982	1983	1984	1985	1986
Projects	209	N.A.	226	246	260	266	274

N.A. - Not Available.

Until regional science fairs, sponsored by the Youth Sciences Foundation (Y.S.F.), gained popularity in B.C., individual schools and school districts sponsored science fairs. As there is no central registry for school or school district science fairs it is difficult to obtain historical data regarding the incidence of school and school district science fairs throughout the province.

However, regional science fairs gained popularity in B.C. in the 1980's. Table 1.2 shows the growth of regional

science fairs throughout the province. In 1982, only one regional science fair was held. In 1984, three regional science fairs were held, and by 1986, seven regional science fairs were held.

Table 1.2 Y.S.F. Regional Science Fairs in B.C.

Region	City	1982	1983	1984	1985	1986
Vancouver Island	Victoria	yes	yes	yes	yes	yes
Vancouver Lower Mainland	Vancouver	no	yes	yes	yes	yes
East Kootenay	Invermere/Kimberly	no	no	yes	yes	yes
Central Interior	Prince George	no	no	no	no	yes
Central Okanagan	Kelowna	no	no	no	no	yes
Vancouver Island North	Port McNeil	no	no	no	no	yes
West Kootenay/Boundary	Trail	no	no	no	no	yes

1.3 Importance of the Problem

This study is important for several reasons. It is anticipated that the School District and individual schools will be able to use the data collected to assist in the improvement of their science fairs. The District will be able to use the information to plan future science fair inservice activities and also to identify where more support is needed for teachers and schools. The study also identified the strengths in current levels of District support and gave all intermediate teachers and principals

the opportunity to express their opinions about science fairs.

The study also provided data about the relationship between science fairs and science instruction. While some (Benson, Kerby, Wofford, & Biggs, 1981, 49) have assumed that "science fair projects provide a reasonably accurate reflection of current science teaching practice", the researcher has been unable to find studies which confirm or refute this assumption. Castner (1967) surveyed teachers, principals and scientists who agreed that science fairs improve science instruction but she did not provide evidence to substantiate this claim. Further searching of the literature revealed that despite the popularity of science fairs, very few empirical studies have been conducted on this topic. This study provided data on a little researched topic.

1.4 Research Questions

1. How many students, classes, grades, and schools participate in science fairs?

The District provides the opportunity for schools to send representatives to the district science fair. The majority of schools choose to participate in the science fair. Information about the participating schools in terms of school size, numbers of students and classes

participating, grades of students involved, and total number of schools participating has not previously been tabulated.

Data on the number of students involved was collected through a questionnaire to every elementary teacher. Data on the number of classes involved and their grade levels was collected through a questionnaire to every elementary principal.

2. How are school science fairs organizied?

The organization of the school science fair is a school-based decision. The District does not provide any written guidelines on the organization of a school science fair. Consequently, there are as many variations of science fairs as there are schools. While this may be desireable, the variety of organizational schemes is unknown.

In particular, the researcher wished to know how schools selected representatives to the district science fair, what grades were involved in the school fair, what awards were given, and where in the school the fair was held.

Data to answer this question was collected through a questionnaire to every elementary school principal. It was assumed that the principal would be aware of how his/her school's science fair was being organized.

3. What is the relationship between science fairs and science instruction as determined by the selection of instructional activities, instructional materials, instructional/noninstructional time allotted, and evaluation procedures?

The district and school science fairs are a major event each year as almost all schools hold a science fair of some kind. No District information was available on how teachers assist their students in the preparation of a science fair project and when this assistance, if any, takes place.

It was known that some teachers provided science instructional time for the preparation of science fair projects. This presented a number of issues which required investigation. First, how many teachers used science instructonal time for the preparation of science fair projects? Second, did participation in the school science fair have any effect on the amount of time being allotted for science instruction? Third, what is the relationship between the science fair and the teacher's selection of instructional activities and instructional materials? Finally, did teachers use science fair project evaluations as part of students' report card marks and if so, how was this evaluation completed?

Data to answer this question was collected through a questionnaire sent to every intermediate teacher.

4. How do teaching experience, sex, science background, inservice, and teacher attitude toward science fairs influence science fairs?

Demographic information about teaching experience, sex of teachers, science background and general interest in science was thought to be useful in finding patterns within the data.

Information about science fair inservice was also requested from the teachers. The researcher was interested in determining how many teachers had attended inservice, which topics about science fairs were found to be useful, whether a need existed for further inservice, and if so, what topics were desired. The researcher had responsibilities for teacher inservice in science at the time of the study.

Data to answer this question was collected through questionnaires to every intermediate teacher and elementary school principal.

1.5 Rationale for the Research Questions

The data from questions 1 and 2 will assist schools with the improvement of their school science fairs. For example, many schools involve primary students in their science fairs. Prior to this study, however, it was not known how wide-spread this practice was nor was it known how the schools organize primary students' involvement. The study found primary students' participation in school science fairs to be very wide-spread and now inservice training can be developed and resources acquired to assist these schools, and also schools who may wish to include primary students in future years.

The data from question 3 was collected to address several issues. One issue was whether the preparation of science fair projects influenced science instructional time. The question of time allotted for science instruction was thought to be important because of the findings of the B.C. Science Assessment (1982) and the Science Council of Canada, Report 36 (1984). Both of these studies found that in a substantial number of classrooms, science is taught for less than the Ministry of Education recommended time allotment.

Another issue was the use of the support materials which are produced annually by the School District to assist teachers and students with the preparation of

science fair projects. The study provided the opportunity to assess the extent to which these materials were being used.

The evaluation of science fair projects was also a concern. Some teachers were known to be using science fair project evaluations to form part of the student's science report card mark. Data regarding the importance of this evaluation and how it was conducted was unavailable prior to this study.

The data from question 4 was used to examine teacher and principal attitudes towards science fairs as suggested by Speece (1978). She suggested that a study be conducted to determine if sex has any influence on teacher attitudes toward science fairs.. A Likert scale developed originally by Thelan (1964), and modified by Speece, was incorporated into the questionnaires which were sent to all intermediate teachers and elementary school principals in the District. The questionnaire sent to the principals provided an opportunity to compare principal attitudes with those of teachers.

1.6 Limitations of the Study

Some limitations of this study have been identified. As always, there are limitations with the questionnaire format and content. While the researcher is confident that the responding teachers and principals are a representative

sample of teachers and principals in Surrey, factors which are beyond the researcher's control inevitably have an effect on the outcome.

One of these factors is the period of time from which the researcher asked the respondents to recall events. Respondents were asked to think about teaching activities, time allotments, and materials selection from as long ago as eight months from their occurence. They were also asked to make comparisons between the fall and spring terms. Due to the side-by-side format of the questionnaire used for making this comparison, it is possible that teachers did not make a comparison but simply repeated their initial assessment from the fall term to the spring term. This limitation would have been minimized by the use of two questionnaires, one distributed in the fall and a follow-up questionnaire in the spring. The researcher could then have made the comparisons based on the separate data sources. However, asking teachers to complete two questionnaires may have adversly affected response rates.

Another limitation of the study was in the timing of the distribution of the questionnaires. The questionnaires could not be distributed until one month after the district science fair which may have been up to six weeks after school science fairs. This occurred due to the timing of Spring Break, and the preparation of report cards for the second reporting period. The researcher wished to avoid

possible conflicts with these events. Teachers are clearly unavailable to respond duing Spring Break and the preparation and issuing of report cards is very time consuming and was thought to detract from teachers' willingness to reply. Consequently, the distribution of the questionnaire was delayed, which may have affected teachers' ability to remember clearly what they actually did for the time periods being surveyed.

In summary, this study examined the Surrey Elementary Schools Science Fair with respect to schools participating in the district science fair, school science fairs, science instruction, and teachers participating in science fairs. The study gathered data from district sources, and teacher and principal questionnaires.

CHAPTER 2

REVIEW OF RELEVANT LITERATURE

Chapter 2 provides a review of relevant literature. While the literature about science fairs is not extensive, many authors have studied or commented on science fairs. The following review is made with particular reference to the research questions detailed in Chapter 1.

2.1 Participation in Science Fairs

Question 1 relates to participation in school and district science fairs. Participation in the Surrey Elementary Schools Science Fair is voluntary. However, it is known that some teachers and schools in Surrey require students to participate in school science fairs. Several authors have commented on the issue of whether participation should be voluntary or mandatory.

Castner surveyed seventh grade students and professionals (teachers, administrators, and scientists) who had been involved in some way with one of two seventh grade science fairs during 1962-1964. Based on statements from students and professionals, Castner concluded that participation in school science fairs should be voluntary. Streng (1966) concurs. She thinks that most elementary children are not capable of independent research without

constant assistance from adults and consequently, participation should be limited to those students who show a genuine interest in science.

Foster (1983) thinks that the issue isn't whether elementary children are capable of independent research but whether they have been taught the pre-requisite process skills necessary to enable them to successfully complete a project. Without sufficient practise in these process skills Foster argues that asking students to complete a science fair project is akin to introducing the alphabet and then expecting children to write a novel. Nash (1985) in personal correspondence, indicates that secondary students in his experience think that teachers do not provide practise in the process skills. Nash, at the time of the correspondence, was surveying previous science fair winners at the Canada Wide Science Fairs held in 1984/85. He asked these students to identify the people who they had found most helpful through the various stages of completing their projects. Very few of the students mentioned teachers. Nash commented further that his two sons had been involved in the Canada Wide Science Fair recently. While he feels that the experience was a valuable one for them, his perspective as a parent is that the schools only attend to the organizational aspects of the fair and that the assistance to the student happens at home.

Paldy (1971) states that compulsory participation is incompatible with the creative, self-motivating, and self-disciplining nature of science. He admits that students, particularly in elementary school, need motivating to participate in science fairs but feels that students should not be forced to do so.

Knapp (1975) indicates that very few children in the sixth through eighth grades refuse to participate in science fair projects if the students are encouraged to work individually or in pairs. In this way the students who are weak in some areas such as reading, writing, and researching are supported and encouraged. He also advocates involving students in experiments they find interesting.

The National Science Teachers Association (1984) in its position statement on science fairs, states that student participation in science fairs should be voluntary.

Only one reference was found which advocated mandatory participation in science fairs. Pearson (1976) when organizing a science fair for the first time in a school district made participation obligatory.

2.2 Science Fair Organization

Question 2 relates to the organization of science fairs. Several issues have been identified in the literature regarding the organization of science fairs,

defining objectives, competition and awards, and grade levels involved.

2.21 Science Fair Objectives

Some authors (McBurney, 1978; Riechard, 1976; and Stedman, 1975) identified the need for science fair organizers to define their objectives before proceeding with a science fair. Stedman offers some suggestions on how to establish the purpose for the fair. He advocates the development of a working definition of science to help identify some issues which will need to be considered. Once the nature of science is defined, teachers will then be able to decide what types of projects will be allowed. Stedman emphasizes the investigative nature of science and suggests that projects which demonstrate an investigative approach should be encouraged and rewarded.

McBurney sees science fairs as "an opportunity to for a student to receive professional assessment and recognition for some personal scientific endeavor of interest to that student" (p. 419). He further argues that the primary goal of a science fair must be the learning experience of the student, and it should not be for the community, parents or other students. While a science fair will inevitably benefit these other groups, this should not be the main objective of the science fair. McBurney also indicates that "clues" regarding the type of judging and

awards will be provided by defining the science fair's primary objective.

In Riechard's opinion, one of the most important and most neglected aspects of planning a science fair is the careful determination of the science fair's objectives. There are many valid reasons for holding science fairs and the structure of the fair will change dependant upon the objectives. In determining objectives, Riechard suggests making them compatible with the school's general philosophy and the general aims of science education and the school's science program. He also suggests taking the nature of the student population into account in terms of their age, grade, intellectual ability, and available support and resources.

2.22 Competition and Awards

Ovian (1971) in his survey of Science Fair Directors and Supervisors of Science throughout the United States, identified competition as an important aspect of secondary school science fair organization. He considered that competition was necessary and, therefore, the projects should be judged and prizes awarded. He recommended that at least a certificate should be awarded to all science fair participants. Fort (1985) agrees that all contestants should be awarded something; a certificate, a ribbon, a medal, or whatever else seems appropriate. She also

comments on a recent science fair that made Superior, Outstanding, or Noteworthy awards to all its participants. Fort suggested this as a possible awards structure for those who wanted an alternate to the more traditional First, Second, and Third place awards.

McBurney, argues in favor of each student competing against a standard, and not competing against each other. The standard should be based on criteria such as the clarity of the problem, integrity of the experimental method and investigative procedures, accuracy of data interpretation and other scientific qualities. He would de-emphasize the aesthetic qualities of the display and would place a greater emphasis on its scientfic integrity and student learning. When awards are made, McBurney feels that the students should be present and that the judges should justify their reasons for making each award. Regardless of the award, McBurney feels that each student should receive some recognition, so no one leaves the fair with the impression that his efforts were in vain, although some would realize that they could have improved upon their efforts.

Stedman also thinks that students should compete against a standard set of criteria. That way all students have the opportunity to win a blue ribbon if their efforts are worthy of it. He further states that the criteria should be published well in advance.

Goodman (1975) agrees with McBurney in that the aesthetic aspects of a display should not have a high priority. He adds, however, that a judge's reaction to a well presented project is intangible but important. Goodman feels that an attractive display conveys to the judge that the student has attended carefully to all of the details of his project, even those that are not necessarily important from a scientific viewpoint.

The professionals involved with Castner's study indicated that awards were valuable and should be presented to ten percent of the outstanding projects in the fair. However, no reference was made to the type of award that should be made to these students. There was no agreement among the professionals regarding whether or not Honourable Mention certificates should be presented to all students who participated.

Competition, however, is not without its critics. Chiappeta and Foots (1984) caution that an emphasis on competition can lead to over-involvement of parents in their children's science fair projects. This robs the student of the potential benefits of participation in the development of their own creative abilities and self-motivation. Burtch (1983) is also critical of competition. He states that competition may be valuable for students who are gifted or highly competitive but that it is potentially harmful to other students. Burtch advocates

evaluating students' projects but not disclosing the results publically nor having awards. Every student would receive a paricipation certificate. After nine years of science fairs, Burtch states that many of his students have been turned on to science but none have been turned off because of losing although he offers no evidence of this.

Lamb and Brown (1984) offer an alternative structure for science fairs to avoid the competition/awards controversy. In organizing a science exposition in Oregon, they included both competitive and non-competitive sections. Originally, it was thought that the non-competitve section would appeal mainly to middle grade students, but found that a large number of high school students chose to enter the non-competitive section. The authors felt that many of these projects were suitable for competition. Lamb and Brown think that student choice may be one way of encouraging excellence in those who thrive on competition while at the same time allowing for those who wish to be involved for reasons other than competition.

2.23 Grade Levels

Another aspect of specific question 2 relates to the grade levels involved in the science fair. Some schools in Surrey include students from Kindergarten to grade three even though no provision is made for their participation in the district science fair. Only one reference to science

fairs for younger students was found in the literature. Kesting (1981) discussed a science fair for preschool students in which a group of university students assisted younger students with science activities in a shopping mall. Although the event was deemed highly succesful, it should not be thought of as a science fair in the traditional sense. The university students planned the activities and set them up in the mall. The children could try as many activities as they wished.

Many (Burtch; Danilov, 1975; Knapp; Rice, 1983; Streng, and others), have discussed and studied science fairs at various grade levels from grades five to beyond high school. All concluded or stated that science fairs were valuable experiences for students providing the objectives to be accomplished and the nature and needs of students were taken into account.

2.3 Science Fairs and Science Instruction

Question 3 relates to science fairs and science instruction. Some (Benson, Kerby, Wofford, & Biggs) have made the assumption that science fair projects provide a reasonably accurate reflection of current science teaching practises. They thought that by assessing the extent which students used the metric system of measurement in science fair projects, they would have a good indication of teacher usage of the metric system in science class.

Thelen suggests that all of the activities leading up to a science fair need to be reappraised. Castner also suggested that the amount and type of guidance which a student requires to complete a science fair project requires further investigation.

The professionals surveyed by Castner almost unanimously agreed that science fairs improve science teaching.

2.31 Science Fairs and the Goals of Science Instruction

Silverman (1985) examined the effects of science fair participation on attitudes of grades seven to nine students. He found that science fair participation increased interest in science. The anecdotal reports of 56 science fair participants showed that they became aware of basic science process skills through their science fair projects. Chiappeta and Foots think that science fairs help students develop science inquiry skills. Students develop skills such as asking researchable questions, gathering information, and drawing conclusions. This promotes independent learning and encourages students to pursue their own interests. Chiappeta and Foots argue that science fair projects should be an integral part of course requirements because they reinforce what students learn in a good science program. The professionals surveyed by

Castner agree that science fair projects should be included in science classes. Castner asked the professionals if science fair projects should be a culmination of classroom studies. 56% reponded yes and 44% responded no.

Others (Knapp, 1975; Stedman, 1975; Streng, 1966; and McBurney, 1978) repeat the argument that completing a science fair project helps students develop a better understanding of, and competency in the processes of science. They argue that the nature of science is one of inquiry and that a major goal of a good science program is to help students understand this. Their discussion centers around the need for students to develop science fair projects which emphasize investigation and experimentation. Hodges, Popp, & Robinson (1974) advocate a five-level system of scientific investigation where level one is a display of information already available to the student in some form, and increasing in difficulty to level five which is an experiment with all important variables controlled. One reason for suggesting this system is so students will recognize that projects which are classified as a higher level project, are more difficult and hence are more deserving of recognition. While Hodges et al. recognize a range of scientific investigation, Smith (1981), does not. He argues that most science fair projects in elementary school are non-investigative and as such do not help the students develop critical thinking, inquiry or

investigative skills. Consequently, Smith feels that most science fairs do not promote the goals of science teaching beyond the acquisition of knowledge and skill in model building.

McNay (1985) thinks that nonexperimental science fair projects do exhibit the goals of good science teaching. While agreeing that experimental design and the scientific method, regardless of how the "scientific method" is defined, are important, McNay feels that they are but one part of the nature of science. Students can only investigate meaningfully those questions which which have already aroused their curiosity. McNay feels that if science teachers force students to pursue experimental topics too soon, the students will not be afforded the wonder and delight that is the essential experience of science. McNay also argues that many topics of interest to students do not lend themselves to direct observation or experimentation. Topics such as the universe and the ocean floor are cited as two examples. Further, she indicates that many students develop a deeper understanding of scientific principals through model building and demonstrations. Finally, McNay reminds the skeptics that much of what is accepted as scientific research in some disciplines, such as descriptive studies of organisms, is nonexperimental. This kind of research she considers just as valuable as experimental studies.

2.32 Science Fairs and Instructional Strategies

Texley (1984) and others (Cramer, 1981; Markle & Cichowski, 1983) have offered suggestions to teachers regarding how to assist students in completing a science fair project. Texley offers suggestions on how students can be taught to generate a problem which can be investigated. She claims that this is the most difficult step for any researcher but that it is a teachable skill. First, she provides a wealth of clippings, abstracts and hypothesis which have caught her eye. She also encourages students to contribute clippings and ideas. Students are then asked to consider topics of interest with reference to five experimental designs. In this way, students can decide which topics can be investigated according to a specific experimental design. They will then be in a position to decide which problems are within the scope of their own resources or limitations. After a topic has been selected, the project is divided into steps and a timeline is developed, with strict deadlines enforced.

Cramer offers suggestions of a more general nature. She suggests that students first decide which branch of science interests them and then narrow the topic. Using already accessible materials, modifying existing experiments, concentrating on neatness and accuracy, and using colourful displays are also suggested by Cramer.

Markle and Cichowski feel that attention-getting demonstrations can motivate students to do scientific research. It is then suggested that teachers set up exploration centres in their classrooms which will continue to provide students with questions to ponder and wonder about. Time is provided for students to try the activities in the centers. This provides the students with a model of what kinds of activities are suitable for investigation. Markle and Cichowski feel that there are three types of projects: experimental, demonstrations, and displays. Students are encouraged to select a topic within this framework.

2.33 Science Fairs and Science Instuctional Time

Knapp identifies lack of instructonal time as a possible reason for the lack of assistance to students in completing their science fair project. He admits that some schools have more strict content requirements than others however, he also states that providing time for students to participate in science fairs is an excellent way to meet those objectives which are related to developing the science processes in students. On that basis he can justify utilizing science intructional time for assisting students with their science fair projects. Texley also recognizes that less content is covered if students use science instructional time for their science fair project work. She

feels that the benefits of science fair project work far outweigh any detriment caused by the lessening of content coverage. Castner found that a majority of the professionals (56%), in her survey, think that class time should not be given to science fair project work. Obviously, those who argued that science fair projects should be part of course requirements support the use of science instructional time for working on those projects.

2.34 Science Fairs and Parental Assistance

The decision to use science instructional time or not is sometimes dependent upon how teachers perceive the issue of parental assistance. Some (Burtch; Cramer; Hamrick & Harty, 1983; Bellipnni, Cotten, and Kirkwood, 1984) are advocates of parental assistance with science fair projects. They feel that much is to be gained from the interaction between parent and child. Parents can assist with taking students to public libraries, construction of difficult or dangerous parts of projects, acting as resource persons, and transporting projects to and from school. Hamrick and Harty argue that there is no better place for learning to occur than at home with a concerned parent. Bellipanni et al. suggest that there may be some instances, such as the use of power saws, where parental assistance is very adviseable. They indicate that the

amount of parental assistance is usually evident when pupils are explaining their project.

As previously mentioned, parental involvement is related to the issue of competition. Chiapetta and Foots caution that over zealous parents can be too involved with their child's science fair project to ensure that it is a winner. Other parents may be reluctant to help because they feel it is inappropriate for them to do so if the project is being judged (Paldy). In either instance, a spirit of cooperation is not present and the student is the ultimate loser.

Castner found a discrepancy regarding parental assistance between the professionals and the students that she surveyed. 64% of the professionals felt that parental help was very evident in the form of assistance to build some of the equipment used or in giving advice to the students. 71% of the students surveyed said their parents did not help them in any way.

Various suggestions have been made to help alevlate the problem of parental involvement, if it is viewed as such. Pearson included a note to the parents indicating that the science fair project was to be the work of the student. Hodges et al. suggest that before the science fair project work begins, students should have a clear understanding of how much and what type of outside assistance is allowed. Further, they advocate that a

statement be made by the student and displayed as part of the project, indicating the amount and type of outside assistance received. Hansen required that all work on science fair projects take place at school, but during non-instructional time. Parent and teacher volunteers supervised the students in the school cafeteria and locked the science fair projects away in an unused classroom for safe keeping. Attendance was also taken so that students could be reminded when necessary.

Henderson (1983) reminds us that parents, and grandparents are well aware of this issue. He received a letter from a grandfather which detailed the extent of the assistance which was provided to his grandson. The rationale for writing the letter was to ensure that the judges did not assume that the level of sophistication of the project was beyond that of an eleven year old. The grandfather obviously felt that the possibility existed that the judges would not give sufficient credit for his grandson's abilities.

Finally, the parts of the NSTA position paper on science fairs pertinent to science instruction, state that "participation (in science fairs) should be guided by the following principles:

- emphasis should be placed on the learning experience rather than on competition;

- participation in science fairs should not be made the basis for course grades;
- science fair activities should supplement other educational experiences and not jeopardize them;
- emphasis should be on scientific content and method;
- the scientific part of the project must be the work of the student"

(cover, 1984).

2.4 Teacher Background

2.41 Science Fairs and Teacher Science Background

One of the issues identified earlier was the lack of instruction from teachers in the skills necessary to complete a project. Knapp identifies lack of teacher science background as a possible reason for teachers not providing the necessary assistance to students. He argues that science fair projects which emphasize process and not content can be overseen by teachers who are non-science majors. Teachers can also ask for assistance from older students, student teachers and other interested adults. However, Knapp feels that students can develop meaningful projects without adult supervision if there is careful step by step planning by the teacher on how to complete a science fair project.

Smith also identifies poor science backgrounds, especially among elementary teachers, as a reason for not providing assistance to students. He states that due to a lack of understanding about the goals of science teaching, elementary teachers feel more comfortable with activities closely related to bookwork and the result is a preponderance of non-experimental projects.

2.42 Science Fairs and Teacher Attitude

While the importance of teacher attitude has been researched with respect to other areas of science instruction, few references exist regarding teacher attitude toward science fairs. Ovian, in his survey of State Supervisors of Science Education and Science Fair Directors, found that lack of interest on the part of teachers, students, and those associated with school was a common problem. Castner reported that all of the professionals that she surveyed indicated that the science fair was valuable and should be presented again the following year. Most of the professionals (80%), were elementary teachers.

Speece included teacher attitude toward science fair as one aspect of her study. She found that elementary teachers had a strongly positive attitude toward science fair. Speece also compared teacher attitude to perceived administrators' attitudes and reports that the perceived

administrators' attitudes do not significantly affect teacher attitudes toward science fairs. Speece suggests that a further study be conducted to determine what effect teacher preparation, age, and sex may have on teacher attitudes toward science fair.

The review of the literature found references to all of the issues to be examined in this study. While many of the references were opinion, some empirical studies were found. It appears that although science fairs continue to be popular, they have not been studied extensively.

CHAPTER 3

DATA COLLECTION

3.1 Introduction

This Chapter will present the methodology of data collection used in this study. A discussion of issues regarding the rationale for and the development of the questionnaires, as well as the analysis of data will be presented.

Mail questionnaires were selected for use as the primary method of data collection. The questionnaires were developed and prepared for distribution to the teachers immediately following the district science fair in March, 1986. Due to the timing of Spring Break for schools and also the issuing of report cards to students, the questonnaires were not distributed until April 14, 1986. Returns were requested by May 30, 1986. This allowed a month for late returns and also ensured that the returns would be completed before school year-end details occupied teachers' and principals' time and efforts. A follow-up letter was sent to non-respondents in the first week of June. A further follow-up letter and a second copy of the questionnaire was sent to non-responding teachers in September, 1986.

3.2 Rationale for Using a Questionnaire Design

The literature reviewed discusses the disadvantages and advantages of using questionnaires to gather data. Butts (1983, p. 187) states that "survey research is a significant way of generating knowledge of what is." This study is particularly interested in determining what is with respect to science fairs in the Surrey School District. As this is the first study conducted in the Surrey School District about science fairs, a major focus of the study is to determine what the current science fair practices are in the District.

Charach (1975) indicates that another advantage of questionnaires is they permit a wide coverage at a minimal expense. The study was designed to survey all intermediate teachers in the Surrey School District. Since there were 356 intermediate teachers at the time of the study, the use of a questionnaire was considered most appropriate. Further, the School District has an internal mail system and the researcher was given permission to utilize this system for the sending and returning of the questionniares. This greatly reduced costs involved with the distribution and the return of the questionnaires. The use of the internal mail system was also desireable as it was anticipated that it would increase the response rate. This was anticipated because of its convenience for the

teachers. After completing the questionnaire, the teachers only needed to put it in the mail bag which is located in the school office.

Sudman and Bradburn (1982) indicate that with few exceptions, no differences are observed in the answers given to the same questions asked by mail, phone, or in person. This being the case, they suggest that other criteria should be used to determine which method of asking questions should be selected. The issues of cost and time were pertinent to this study. As previously mentioned, costs were greatly reduced through the abilty to use the internal mail system. Time was particularly important as the study was asking teachers to remember events during an eight month period. It was also desirable to have the responses returned as quickly as possible because the summer holidays would interfere with future returns.

Given the nature of the informaton being sought, the large number of teachers involved in the study, the cost advantage, and the time factor, a mail questionniare was selected as a desirable methodology for this study.

3.3 Description of the Questionnaires

This study researches four aspects of science fairs in Surrey:

a) participation in school and district science fairs,

b) organization of school science fairs,

c) relationship between science instruction and science fair participation,

d) teacher participation in science fairs.

Information about schools participating was available from District sources. Information about individual school science fairs was determined through a survey of the elementary school principals in Surrey. Informaton about what happens in science classes and about teachers was determined through a survey of all intermediate teachers in Surrey.

Both the teacher's and the principal's questionnaires were designed to enable ease of response yet accurately elicit the information being sought. Answers to all questions fit into a closed response structure but made allowances for other response options where appropriate. Respondents were provided with an "other" response category and asked to specify what the other option was. This was done to reduce possible respondent frustration on not finding a suitable response category in the closed format. Frustration may lead to a lower return rate (Sudman and

Bradburn). The last page of both questionnaires provided space for general comments about the science fair.

3.31 Principal's Questionnaire

It was assumed that the principal was knowledgeable about the organization of the school science fair. A questionnaire was developed to determine current practices of science fair organization in Surrey schools and was sent to all elementary school principals. The questionnaire asked questions about the grades involved, the viewing times, the location of the science fair in the school, the awards given, and the selection procedures for determining the school representatives to the district science fair. An attitude scale was included to assess the principal's attitudes toward science fairs.

3.32 Teacher's Questionnaire

Teachers were thought to be best able to answer questions about what they did in their science classes and about themselves. A questionnaire was developed and asked questions about teacher background, inservice, science intstructional time, science instructional materials selection, science instructional methods, pupil participation, assistance to pupils in completing their projects, and project evaluations. An attitude scale was

also included to assess the teacher's attitudes toward science fair. The questionnaire was duplicated on both sides of the page to reduce the appearance of its length (nine pages).

3.4 Questionnaire Design

Sudman and Bradburn offer suggestions on the design of the questionnaire. Format and content are particularly important to consider in the questionnaire design.

The questionnaires in this study were developed originally from a content perspective and format considerations were addressed later in the development. The first draft of the questions were submitted to an experienced researcher for comment on the general issues being explored and also on the specific questions being asked. Based on comments received, a second draft of the questionnaires were made, correcting the problems identified. This second draft of both instruments was then resubmitted to the researcher for further comment. The second draft of the teacher's questionnaire was also submitted to a sample of convenience of five teachers who were members of the science fair committee. These teachers were asked to complete the questionnaire and to make note of the time required to complete it. Time was thought to be important because the teacher's questionnaire appeared to be quite long. A personal or phone interview was held with

each of these teachers. They were asked about the content of the questionnaire, and which questions were unclear or in need of revision. This sample of teachers was selected because they were representative of the population which was to be surveyed and also because they were knowledgeable about the district science fair and could comment about the general issues which the questionnaire was addressing. Most of the comments received about the questionnaire from this group of teachers related to format and not content. They responded that the content of the questionnaire was accurate with respect to the stated questions, and each was seen as clear and easily answered. The five teachers were also asked to respond orally to the questions. These answers were cross checked with their written responses. The comparison revealed that the responses were consistent both orally and written. At this time, further revisions were made with respect to format. Care was taken to not alter the content of the teacher's questionniare or of specific questions during these revisions. Several revisions with respect to format were made and each revision was submitted to the experienced researcher for comment.

The principal's questionnaire underwent a less rigorous developmental procedure due to nature of the questions being asked. The principal's questionnaire is much shorter and asks for factual information about science

fair organization and for demographic information about the school. The first draft of the questions were submitted to the experienced researcher and revisions made based on comments received about the content. The principal's questionnaire utilized the same format as the teacher's questionnaire.

An attitude scale originally developed by Thelan, and modified by Speece, was added to the completed questionnaire as a means of assessing teacher and principal attitude toward science fair. Speece suggested that a comparison of principal and teacher attitudes would be a valuable follow-up study to hers.

Finally, both questionnaires were examined by an expert in data entry who suggested appropriate coding for ease of data entry of the completed questionnaires. After coding, another sample of convenience of five teachers were asked to complete the questionnaires. These teachers were asked to record the time taken to complete the questionnaire and also whether the coding interfered with their responses. All responded that the coding did not interfer with their responses and that the questionnaire took approximately 15 minutes to complete.

The issue of time taken to complete the questionnaire was important as the teacher's questionnaire was nine pages long and included 24 questions. Many of the questions were multiple part questions. One concern was the amount of time

that teachers would be willing to devote to completing the questionnaire. It was felt that 15 minutes was acceptable to most teachers but that the response rate would be adversely affected if the time required to complete the questonnaire was much longer than 15 minutes. Although the questionnaire was lengthy, it was designed for ease of completion to meet the 15 minute criteria. (See Appendices VI & VII for copies of both questionnaires.)

3.5 Target Population

The target population of this study comprises all intermediate teachers and all elementary principals in the Surrey School District. This population was selected as being the most knowledgable about the items of concern in the study. The names and schools of the teachers and principals were made available to the researcher by the School District. The total accessible population of principals was 62 and the total accessible population of intermediate teachers was 356.

3.6 Questionnaire Return Rate

The question of response rate is a relative one. Babbie (1973, p. 165) states that it is more important to "demonstrate a lack of response bias than a high response rate." He further indicates that a response rate of 60% is good and a response rate of 70% is very good although he

admits there is no statistical basis for this scale. A sample of convenience of 10 non-respondents were surveyed as to why they chose not to respond. The non-respondents indicated that four were on leave of absence, one was an exchange teacher, four did not teach science so did not feel that they were supposed to complete the questionnaire and one teacher did not wish to do so. Further, the responses were tabulated by school and returns were received from every school in the District. Consequently, the researcher feels that the teacher responses received are a representative sample.

3.61 Teacher's Questionnaire Return Rate

Of the 356 teacher's questionnaires distributed, 10 were returned indicating that the teacher was on leave of absence or was no longer employed in the Surrey School District. Following accepted practise (Babbie), these 10 are subtracted leaving a net sample size of 346 teachers. The number of completed questionnaires was 266. The response rate for the teacher's questionnaires was 77%.

3.62 Principal's Questionnaire Return Rate

Of the 59 principal's questionnaires distributed, 52 were returned. One of those was returned with only the attitude scale and school size question completed as the school did not participate in the science fair. The net sample size was 59 and the response rate for the principal's questionnaire was 88%.

3.7 Analysis of Data

Since the major purpose of this study is to determine the current practices of science instruction and science fair organization in the Surrey School District, frequencies of response expressed in the form of percentages were the major method of analysis. In some instances relationships between and among questions were looked for in the form of cross-tabulations. Rank order tables were generated for the attitude scales in the teacher's and principal's questionnaires for the purpose of comparison.

CHAPTER 4

SUMMARY OF DATA

This Chapter summarizes the data collected by the researcher through the questionnaire, and includes relevant information made available by the School District. Descriptive statistics are presented for the following areas:

4.1 Participation in the School and District Science Fair

4.2 Organization of School Science Fairs

4.3 Relationship between Science Instruction and Science Fair Participation

4.4 Teacher Participation in Science Fairs

Information pertaining to sections 4.1 and 4.2 was derived from District sources and the principal questionnaire. Information pertaining to sections 4.3 and 4.4 was derived from the Teacher questionnaire. Within each section, general categories are listed. Specific findings are noted by underlining a summary statement which is followed by the more detailed information that was collected. Percentages listed in the findings have been rounded off to the nearest whole number. Appendices I and II provide all the information in detail which was collected by the researcher, including exact percentage

responses to each question and comments received relative to each question. Appendices III and IV contain verbatum responses to the General Comments section of the questionnaires.

4.1 Participation in School and District Fair

4.101 Most Surrey schools participate in science fairs.

In Surrey, elementary schools which enroll grades 4-7 can participate in the District science fair. Data collected by the District shows that of 59 schools, 56 entered projects (95%). 52 (88%) responded to the survey.

4.102 Schools of all sizes participate in science fairs.

Almost three quarters of the responding schools (73%), had more than ten classes, while just less than one quarter of the schools (23%), had between five and nine classes. Only one school reported less than five classes in the school.

4.2 Organization of School Science Fairs

4.21 Participation

4.211 Most schools involve grades K to 7 students in their science fairs.

Almost half (46%) of the schools involved all their grades (K-7) in one school science fair. A further 25% involved all grade levels in two separate science fairs, one for primary grades and one for intermediate grades. 15% of schools indicated an intermediate grade level fair only. 11% of schools report alternative structures such as single grade fairs and exhibitions without judging for primary grades.

4.212 Few schools require all students to participate in science fairs.

Principals reported that 560 classes in total participated in school science fairs.

Only 10% of the schools required all pupils to participate in the school science fair. 40% of schools require only intermediate pupils to participate. In half of the schools, either individual teachers require their students to participate (27%), or interested pupils decide to participate (26%).

4.213 Student participation in science fair is high.

Intermediate teachers reported having 5 850 pupils in their classes. 4 827 students completed a science fair project (83%). 85% of schools include primary students in their school science fair so the total student participation in science fairs is much higher than reported.

4.214 Most schools enter all science fair projects in the school science fair.

In 75% of the schools responding, all science fair projects were entered in the school science fair. In the remaining schools, only the best projects from each class were selected.

4.22 Awards

4.221 Almost all schools present awards for science fair participation.

92% of schools present ribbons, certificates, buttons or similar items to students who participate.

4.222 Half of the schools present placement awards by grade level.

Half of the schools provide awards for First, Second, Third, or provide 2-5 Excellence awards for each grade level. 11% of schools provide awards for each category

but not necessarily for each grade level. About one third of the schools (35%), provide awards only to those pupils selected to represent the school at the District science fair.

4.223 School science fair winners progress to the District science fair.

Winners from the school science fair (88%), were selected to represent the school at the District science fair. Teachers made this selection in 70% of schools. Other groups selected school winners as follows, community members (40%), School District officials (38%), parents (25%), and secondary students (17%). Most schools used more than one of these groups to make the selection of school winners.

4.23 Viewing of School Science Fair

4.231 All schools encourage viewing of their science fair.

Almost half of the schools (48%), encouraged viewing of the science fair during both the day and the evening. One quarter of the schools (25%), reported viewing only during the day while the remainder (21%) reported viewing only in the evening.

4.232 Most schools have a centralized display of exhibits.

The majority of schools (68%) displayed their projects in one or two large areas within the school. 29% of schools moved the best projects from each class into one large area and left the remainder in the classroom.

4.3 Relationship Between Science Instruction and Science Fairs

4.31 Science Teaching Activities/Materials

4.311 The incidence of use of various teaching activities does not vary.

Teachers reported not varying the instructional activities used in their science classes from the fall to the spring.

4.312 Libraries are used more prior to the science fair.

12% of teachers indicated using library research weekly in the spring whereas 5% indicated using this activity weekly in the fall.

4.313 The incidence of use of various teaching materials does not vary.

Teachers reported not varying the instuctional materials used in their science classes from the fall to the spring.

4.32 Science Instructional Time

4.321 Teachers do not change the amount of instructional time to accomodate science fair.

Teachers do not vary substantially the amount of time for science teaching from the fall to the spring. Some teachers do however, provide extra time out of science classes, in the spring to help students prepare for the science fair.

4.33 Extra Time: In-class/Extra-curricular

4.331 Teachers do provide extra in-class and extra-currircular time to accommodate science fair.

More than half of the teachers (55%), reported allotting extra in-class time to allow students to work on their projects. 20% of the teachers provided 30 minutes per week. More than half of the teachers (52%), reported helping students outside of regular instructional time. 30 minutes per week was the most

frequent allocation of time. In total, teachers helped 1259 students outside of regular instructional time.

4.34 Student Preparation Activities for the Science Fair

4.341 Teachers use a variety of activities to assist students in preparing for the science fair.

Of activities/resources used to assist students in the preparation of a science fair project, discussion was the most popular activity (77%), followed closely by the use of the pupil information booklet (76%). (The Surrey School District produces and updates a pupil and a teacher information booklet yearly.) Slides of projects entered in previous District science fairs were used by 58% teachers, while 55% used the teacher information booklet. Many teachers (42%), put up wall displays on how to complete a science fair project. 21% of teachers used their own slides of science fair projects, filmstips about science fair projects or a presentation from the Science Helping Teacher. Presentations by another person, most commonly the teacher-librarian, school science fair coordinator, or older students, were used by 18% of the teachers. Other activities listed by teachers included public speaking practice, lettering classes, library book and

magazine displays, displays of science fair ribbons, and past projects.

4.342 Teachers would like to have additional resources for the preparation of science fair projects.

More than 80% of teachers want a video tape on preparation of a science fair project. Over 70% want video tapes of pupil presentations while 62% of teachers would use exhibits from previous science fairs.

4.35 Evaluation of Science Fair Projects for Reporting Purposes

4.351 Science fair project evaluations are used for Science report card marks.

70% of teachers use the evaluations as one part of the report card mark in Science.

21% of teachers used the science fair assessment to provide 30% of the science report card mark.

Teachers relied mostly on themselves as the evaluator (34%) or together with the judges' evaluations (33%) in deciding the report card mark. Some of the teachers (10%), used pupil self evaluations. Also used were the teacher, student and class evaluations following a student presentation to the class.

21% of teachers do not use science fair project evaluations for report card purposes.

4.352 Teachers evaluate the science fair product rather than the process.

60% of teachers evaluate the display and completion of the project. Pupil presentation to the class (47%), and the judging criteria suggested by the District guidelines (34%) were the next most popular options chosen. Teachers used pupil presentations to the teacher (25%) and to the judge (21%). Only 12% of teachers evaluated each step completing a project. Other items listed were student effort, selection for inclusion in the school science fair, content, and student perceived benefits i.e. what the student thought they gained from the experience.

4.4 Teachers Participating in Science Fairs

4.41 Total Responses

A total of 228 out of 356 teacher questionnaires were returned. As calculated in Chapter 3 this is a 77% response rate. Male and female teachers responded in equal numbers.

4.42 Teacher Science Background/Interest

4.421 Responding teachers have a varied science background.

29% of teachers reported high school courses as the highest level of science course completed while 45% reported that they had completed up to 200 level university courses. The remaining 24% of teachers have completed upper level university courses.

4.422 Responding teachers show an interest in science outside of school.

More than one third of teachers (38%), reported reading about science weekly while a further one fifth (21%), read about science monthly. Half of the teachers read about science 3-6 times a year. Only 4% never read about science. T.V. watching parallels reading patterns.

4.43 Teaching Experience

4.431 Most responding teachers have more than 10 years teaching experience.

63% of the teachers had more than 10 years experience, while 26% had between 6 and 10 years experience. Almost 10% had less than six years experience and only

one teacher responding to the questionnaire was a beginning teacher.

4.44 Teacher Inservice Relating to Science Fairs

4.441 A majority of responding teachers have not attended inservice programs about science fairs.

62% of teachers have never participated in inservice programs about science fairs. Those who had attended after school workshops were more frequent (21%), than teachers who had attended either a Professional Day workshop (15%), or a workshop at a conference (11%). Other inservice programs attended were listed as staff meeting presentations, presentations in class, and discussion groups after school.

4.442 Most teachers reported that they would attend science fair inservice.

75% of teachers reported that they would attend science fair inservice programs. More than half (56%), preferred to attend a Professional Day workshop, while 44% would attend a workshop at a conference. Just over one third (36%) would attend an after school workshop.

4.45 Teacher and Principal Attitude Toward Science Fair

Teachers and principals were asked to respond to 11 statements about science fairs on a Likert-type scale. The response categories were:

1....agree very much

2....agree somewhat

3....agree very little

4....disagree

Frequency of response in percentages were calculated in each response category for each statement. (See Appendices I and II for statements and frequencies.)

4.451 Teachers and principals have similar attitudes towards science fair.

There are very few differences between teachers' and principals' attitudes toward science fair. Table 4.1 shows a comparison between teachers' and principals' attitudes toward the 11 statements. The statements are ranked according to the frequencies of response for the response category 'agree very much' only. The statement with the highest frequency of response was ranked 1 and the remaining statements were ranked in descending order to the least frequently selected statement. If the statements ranked one to four are

considered, both groups rated the same four statements most positively. The statements ranked two and four (earned recognition, and work independently) were reversed between the two groups. If the statements ranked 8 to 11 are considered, again both groups rated the same four statements similarly but reversed the statements ranked 9 and 11 (understanding science, and meet other adults).

Table 4.1 Teacher and Principal Attitude Toward Science Fair

Question Topic	Rankings Teacher's	Principal's	Question Topic
Work beyond class	1	1	Work beyond class
Work independently	2	2	Earned recognition
Practise research	3	3	Practise research
Earned recognition	4	4	Work independently
Develop poise	5	5	Develop poise
Work cooperatively	6	6	Role of science education
Role of science education	7	7	Work cooperatively
Develop thoroughness	8	8	Develop thoroughness
Meet other adults	9	9	Understand science
Meet other students	10	10	Meet other students
Understand science	11	11	Meet other adults

4.452 <u>There is strong to moderate agreement about the benefits of science fairs</u>

If the frequency of responses to the response categories 'agree very much' and 'agree somewhat' are totalled, the range of agreement with all the statements for the teachers is 90% to 67%. The range of agreement for the principals is almost identical (90% to 63%). (Example of calculation: Science fairs stimulate students to work beyond what is covered in

class. Principal's frequencies: 'agree very much' = 63.5%, 'agree somewhat' = 26.9%, total = 90.4%.)

Both teachers and principals felt most in agreement that science fairs stimulate students to work beyond what is covered in class, science fairs allow students to work independently, science fairs provide students with a chance to gain practise in research, and science fairs provide students with earned recognition.

Both groups felt least in agreement that science fairs promote an understanding of the scientific method, science fairs help students meet other students or adults with similar interests and knowledge, and science fairs teach students to be thorough.

4.46 Teachers' General Comments About Science Fair.

4.461 Teachers used the opportunity to comment about science fairs.

The last page of the teacher's questionnaire was a lined page asking for general comments. Of the 228 respondents, 89 teachers (39%) wrote comments. The comments ranged from simple "Keep up the good work" type comments to lengthy suggestions for improvement or reasons for not supporting science fair.

A complete listing of all general commments received is in Appendix III.

4.462 Many teachers commented positively about science fair.

Many teachers (28) made positive comments about science fairs. Teachers said the District was to be commended on the organization of the science fair and also on the amount of support provided to teachers. Some teachers commented that it was the only District academically oriented event and that it was very worthwhile. The cooperation between parents and children, and the public relations benefits were also listed as positive aspects of the science fair.

4.463 Many teachers made suggestions about improving the science fair.

29 teachers made suggestions for improvement. Teachers suggested allowing group or class projects to be entered in the science fair. Parents not helping their children and making participation voluntary were also suggested. Some teachers suggested changing the format of science fair to allow for problem solving activities by the students. Dividing the science fair into two regional science fairs and providing more support to those students who would like to enter the

Vancouver Regional Science Fair was mentioned by teachers.

4.464 Many teachers made general comments about the science fair

There were 19 comments made which were of a general nature. They included comments about not having sufficient time to participate this year because of the new Social Studies curriculum and that science fairs do not foster an understanding of science methods. One teacher commented that the questionnaire provided some good ideas for next year's science fair.

4.465 Some teachers were critical about some aspects of the science fair.

Some teachers (13) made critical comments about various aspects of science fair. The competitive aspects of the fair were criticized by some teachers. The science fair was also thought to be too big, too chaotic, too repetitive and some students had too much parental help.

4.47 Principals' General Comments About Science Fair

4.471 Principals used the opportunity to comment about science fair.

The last page of the principal's questionnaire was a lined page asking for general comments. Of the 52 respondents, 39 principals (75%), wrote general comments. The comments ranged from single sentence comments such as "One of the major academic events of the year", to a detailed comment of two pages.

A complete listing of all comments received is in Appendix IV.

4.472 Some principals made positive comments about the science fair.

Five principals made comments which were mostly positive. Other principals included positive comments about specific aspects of the science fair. The public relations aspects were thought to be valuable. Science fair was listed as being a source of positive feedback for the students, a good learning experience and a major academic event for the District.

4.473 Some principals made suggestions for improving the science fair.

Five principals made suggestions for improving the science fair. Other principals included suggestions as part of a more general comment. Holding the science fair every other year was suggested by a few principals. Other suggestions were displaying previous winning projects and highlighting the science fair more in the community prior to its occurence.

4.474 Many principals made comments which were of a general nature about the science fair.

Many of the comments (15) received were of a general nature. They included reasons for non-participation, changes that the school made to improve their own science fair, or summarized comments from the parents. Some principals discussed issues such as making science fair voluntary, the awards system, or the need for a knowledgable staff.

4.475 Two principals were critical of science fair.

Only two principals wrote comments which were mainly critical about science fair. One of these was very lengthy and well thought out. Other principals included one or more criticisms as part of a more general comment. Many of the criticisms were about competitive aspects of the science fair.

CHAPTER 5

CONCLUSIONS, AND RECOMMENDATIONS

5.1 Introduction

The purpose of the study was to examine the current status of science fairs in the Surrey School District and is of particular relevance to teachers and administrators in Surrey. It is also relevant to other educators who are involved or interested in science fairs at the elementary school level.

The study centered around four general areas of investigation:

(a) participation in school and district science fairs,

(b) organization of school science fairs,

(c) relationship between science instruction and science fairs,

(d) teacher participation in science fairs.

The conclusions, discussions, and limitations will be presented within the context of these four areas.

Due to the volume of information gathered in this study, the discussion of results will highlight those areas of particular importance to the researcher and the Surrey School District. The reader is encouraged to peruse the data listed for each questionnaire. The verbatum general

responses may also be of interest to some readers. This information is contained in Appendices I-IV and may help the reader to draw further inferences that may be of particular interest.

5.2 Conclusions

5.21 Participation in School and District Science Fairs

Question 1 is: How many students, classes, grades, and schools participate in science fairs?

Information to answer this question was obtained from School District sources, the principal's questionnaire, and the teacher's questionnaire.

It was found that 56 elementary schools (95%), voluntarily participated in the district science fair (grades four to seven). Most schools (85%), involve both primary and intermediate grade levels in their school science fair but not necessarily together in one science fair. 560 classes (K-7), were reported by the principals as having taken part in the science fair and 4 827 intermediate students (83%), completed a science fair project. The actual number of students who participated in a science fair in the Surrey School District is higher than that reported because only intermediate teachers were surveyed and asked for the number of students

participating. Consequently, primary students were not included in the student participation figures.

One area of interest to the School District was the participation of primary students in science fairs. Clearly, a large number of primary students participate. Since the School District support for science fairs currently focusses on intermediate grades, there is a need to assess the support that primary teachers need and desire in order for them to be more effective in assisting their students with a science fair project. It would also be valuable to assess the benefits to primary students from participation in science fairs, as perceived by their teachers and parents.

5.22 Organization of School Science Fairs

Question 2 is: How are school science fairs organizied?

Information from the principal's questionnaire was used to answer this question.

In most schools (75%), all of the student projects were entered in the school science fair and almost all schools presented some form of participation award. Half of the schools made placement awards by grade level but 35% of schools have placement awards only for those students who are selected to represent the school at the district science fair. All schools encourage viewing of the science

fair by the community. Most schools have a centralized display of science fair projects.

Crosstabulations were conducted with respect to school size and selection of projects for the school science fair. 25% of schools selected only the best projects from each class to enter in the school science fair. The researcher was interested in determining whether large schools selected only the best science fair projects for the school science fair more frequently than small or medium size schools. Table 5.1 shows the result of the crosstabulation.

Table 5.1 School Size vs. Project Selection

School Size	Every Project	Best Project
1-5 Classes (small)	1	0
6-10 Classes (medium)	10	1
10+ Classes (large)	25	12
Totals	36	13

Of the 13 schools that selected only the best projects from the classrooms, only one school had less than 10 classes or was not a large school.

Schools generally do not have large numbers of tables which can be used for displays nor do they have many large areas for displaying science fair projects. If a school has more projects than will fit in its gym, then the library is

usually the only alternative display space for most elementary schools. Based on the cross-tabulations data, it is probable that schools selecting only the best science fair projects for their science fair make this selection because of space considerations and not on the quality of the exhibits on display.

The researcher supports the inclusion of as many science fair projects as is possible in elementary school science fairs and it appears that the majority of teachers and principals in Surrey do as well.

The topic of awards, and hence competition, deserves some discussion. Half of the schools provide placement awards by grade level. At the district science fair placement awards are designated by category, not by grade level. Some schools provide placement awards for both grade and category. Some schools provide placement awards for intermediate grades only, while some schools provide placement awards for all grades. One school chose not to enter the district science fair because of the competitve nature of the fair. In Surrey, there is variation in the school science fairs awards structure.

One structure for awards that was discussed in the literature review was the establishment of a standard. If the project was judged to have met that standard, then it would receive the appropriate award, regardless of the number of other students who also achieved that standard.

In that way, each student has an opportunity to achieve a first place award and if they don't, they will know why they didn't achieve it. This lessens the competitive aspects which some find objectionable, but still provides an incentive for the students to strive for. Currently this award structure is not being used in the Surrey School District. The researcher thinks this structure should be considered.

5.23 Relationship Between Science Instruction and Science Fair Participation

Question 3 is: What is the relationship between science fairs and science instruction as determined by the selection of instructional activities, instructional materials, instructional/noninstructional time allotted, and evaluation procedures?

Information to answer this question came from the teacher's questionnaire.

Teachers do not change their instructional activities, their instructional materials, or their instructional time significantly from the fall to the spring.

Teachers do provide extra in-class time and extra-curricular time for science fair activities. The most frequent allotment of extra time was 30 minutes per week.

A large proportion of teachers use science fair project evaluations as part of the student's science report

card mark. The completed display and pupil presentations were the most frequently evaluated aspects of the science fair project. Although completing a science fair project is a complex process usually involving an extended time period, the emphasis on evaluation seems to be on the end product and not on the process or the products of the various stages in the process. The assumption by the teachers appears to be that if the end product is well done then so were all of the steps leading to the completion of the science fair project.

A concern with this emphasis on evaluating the end product is that students who are not completing each step of the project satisfactorily may continue to do so throughout the entire project. This unsatisfactory work may not be found out until the finished project arrives for the science fair. By then, it is too late to be corrected. If each step were evaluated, the teacher would be able to identify those students in difficulty much earlier in the process. Adequate guidance could be given and the student and teacher would be much more satisfied with the result. This approach would seem to be particularly important for those students who are completing a project for their first time.

The emphasis on evaluating the end product is consistent with teachers' lack of accomodation of science fair project related activities in their science classes.

It appears that the science fair and related activities are viewed by teachers as an extra and not as an integral aspect of science instruction. This supports the personal correspondence of Nash, as reported in Chapter 2. As a parent, he felt that schools were very attentive to the organizational aspects of the science fair, but provided little assistance to students and parents. While teachers do not appear to vary their science classes, discussion, use of the Surrey School District pupil information booklet, showing slides of previous science fair projects, were all used by a majority of the teachers to assist their students with completing a science fair project.

Teachers would like to have additional resources to assist them in their work with students. A large number of teachers requested video tapes showing the steps used in the completion of a science fair project. Teachers also requested video tapes of student presentations of their science fair project. Some teachers in their general comments also requested information about how to integrate science fair activities with the science curriculum.

The lack of integration and emphasis on product instead of process found in this study can be interpreted as a lack of understanding, on the part of most elementary teachers, of what constitutes good science instruction. The Science Council of Canada (1984, p. 17) states that "science education encompasses both processes and knowledge

that can nurture a child's intellectual growth." The B.C. Elementary Science Curriculum (1981) identifies four goals for the elementary science program. They are the development in students of:

(a) appropriate science attitudes

(b) processes and skills of science

(c) scientific knowledge, and

(d) creative, rational, and critical thinking.

The investigative nature of most science fair projects, whether they are experimental or non-experimental, would seem to contribute toward the development of all four prescribed goals and also comply with the Science Council's definition. Therefore, those teachers with a good understanding of science and how to teach it should have no difficulty in justifying the use of science instructional time for science fair project activities.

Teachers seem equally unclear about the topics of instruction. In two places, teachers who were using prescribed or supplementary units were asked to list the specific titles of units that they used. A large number of teachers did not distinguish between those units which were prescribed and those units which were supplementary. Units such as Batteries and Bulbs, Mealworms, and Mystery Powders were listed in both sections of this question as were rockets, salmon and National Geographic materials. There seems to be misunderstanding on the part of teachers as to

what units/topics are prescribed vs. supplementary even though the current curriculum has been in place since 1981. The point to be emphasized is not that teachers shouldn't be teaching these units, but that they should be aware of how their teaching fits with the prescribed curriculum.

5.24 Teacher Participation in Science Fairs

Question 4 is: How do teaching experience, sex, science background, inservice, and attitude influence science fair activities?

Information to answer this question was obtained from the teacher's questionnaire. Information about the principal's attitude was obtained from the principal's questionnaire.

Teachers responding to the questionnaire have a varied science background and show an interest in science outside of school through reading about science and watching science-oriented T.V. programs. An equal number of male and female teachers responded to the questionnaire. Most of the teachers have more than ten years teaching experience but have not attended inservice programs about science fairs. Most teachers responded that they would attend science fair inservice. Many teachers responded that they would attend an after school inservice session.

Based on these responses, an after school workshop in late January 1987, was organized for Surrey teachers.

Topics listed for the workshop included motivating students, webbing techniques, organizing fairs, and a panel discussion. These were all topics requested by teachers in the survey. Although 83 teachers responded that they would attend an after school workshop, only nine teachers actually attended it. It appears that teacher response on a questionnaire is not always indicative of future behavior.

Teachers and principals attitudes towards science fair were generally supportive. Crosstabs comparing male and female teachers attitudes were conducted and no difference was found between the two groups. Teachers and principals agreed most that science fairs stimulated students to work beyond what is covered in class and provided students with an opportunity to gain practise in research. Teachers and principals also agreed least that science fairs promote an understanding of the scienctific method and that science fairs teach students to be thorough.

These findings are consistent with earlier findings about teachers' approach to science fairs and science instruction. Obviously, teachers who do not teach or evaluate the process of completing a science fair project would feel that the students would be working beyond class work, and would gain practise in research. It is interesting, however, that they do not think that an understanding of the scientific method is developed by the students nor that the students are taught to be thorough.

Perhaps if teachers were evaluating the process throughout, they would be able to assist those students who were not being as thorough as the teachers expect. Teacher's thoughts on the lack of development of the scientific method may stem from a general lack of understanding on the part of teachers as to what the "scientific method"[1] is. Again a closer monitoring of the process may provide some insights for teachers about the "scientific method". It is possible that the lack of experimental projects in many elementary science fairs contributing to this attitude. However, as McNay argues, the non-experimental science fair project may be just as valuable as the experimental project for assisting students to develop a deeper understanding of science.

[1] The researcher is aware of the controversy regarding the definition of the "scientific method". Suffice it to say that however the teachers are defining this term, it is not, in their opinion, being developed through science fair activities.

5.3 General Comments

The researcher considers that a comment is deserved about the General Comments sections of both teacher and principal questionnaires. The last page of the questionnaires invited the respondents to comment about the Surrey Elementary Schools Science Fair. The researcher was

impressed by the quantity and quality of the responses to this section. This is particularly noteworthy when the length of the teachers' questionnaire is considered. Teachers and principals in Surrey have well established opinions about the science fair and appear to have been willing to express them.

5.4 Recommendations

The following recommendations are made based on the information obtained in this study. Information presented in the literature review (Chapter 2), and data obtained through the questionnaires was used in formulating the following recommendations.

5.41 Surrey Elementary Schools Science Fair

Teacher and principal attitudes toward the science fair were generally positive. Many positive comments about the science fair were also received in the general comments section. This is not surprising, however as the science fair is well supported by the teachers and principals of the Surrey School District as is evidenced by the large voluntary participation in the district science fair. It is recommended that:

the Surrey School District continue to sponsor and support an elementary schools science fair each year.

5.42 Science Fair Objectives

Several authors and researchers consider it imperative to have objectives for science fairs. They argued that once a set of objectives was defined then many concerns, such as awards, parental involvement, etc., can be easily dealt with. The Surrey School District does not have set of written objectives for the district science fair. While this is so, it is likely that the committee members and organizers have goals and objectives which they think are being met as the fair is seen to be worthwhile. However, there continues to be concern among many teachers and parents as to the purposes for participation in the science fair. It is recommended that:

the Surrey School District develop and publish a set of objectives for the district science fair.

Further, a number of the comments from teachers also show a need for schools to clarify their reasons for chosing to participate in the science fair. It is recommended that:

elementary schools who choose to organize a school science fair develop and communicate to the parents and students, a set of objectives for the school science fair.

5.43 Primary Science Fairs

A large number of elementary schools choose to include their primary students in science fair project activities. The school district currently provides resources and assistance to intermediate teachers in a variety of ways but has not developed any assistance specifically for the primary grade levels. It is recommended that:

those responsible for the science fair determine and develop the kinds of assistance necessary for primary students to enable them to benefit from their participatation in science fair activities.

5.44 Awards

There are a variety of awards structures in use in the Surrey School District. The district science fair chooses to make placement awards by category while close to half of the schools choose to make placement awards by grade level. Other awards structures are also in place in various schools but none have chosen to have students compete against a standard. It may be that schools are unaware of this alternate structure, especially those schools who are critical of competition between students. Competition could be discussed with respect to the objectives that a school sets for its science fair. Some schools may have students compete against a standard and not against each other and

so be more congruent with their school philosophy and science fair objectives. It is recommended that:

schools examine their science fair awards structure with respect to their school philosophy and science fair objectives.

Although most schools provide participation awards, some do not. It would seem reasonable that in the elementary grades all students should be given recognition for their efforts. It is recommended that:

all students who participate in a school science fair receive a participation award of some kind.

5.45 Science Instruction

This study examined the relationship between science fair activities and science instruction. It was found that teachers appear to treat science fair activities as unrelated to their regular science instructional methods, materials, and time allotments. Science fair is seen as an extra and not an integral part of their science instruction. It is recommended that:

ways be developed to help teachers integrate science fair activities with their regular science classes and meet the goals of the science curriculum.

It is also recommended that:

teachers and schools who choose to participate in science fair be given assistance with the integration of science fair activities as part of their science classes.

Another issue related to science instruction is the evaluation of science fair projects. Most teachers evaluate students' science fair projects for the purpose of forming some portion of the students' science report card mark. The majority of teachers evaluate the product and not the process. Part of the reason for this may be that teachers view science fair as an extra and most of the science fair project work is carried on outside of the school. Teachers also agreed least that science fairs teach students to be thorough and that science fairs help students develop an understanding of the scientific method. It may be that if teachers were evaluating the process of completing a science fair project as well as evaluating the product, teachers would then be able to assist the students with being more thorough and also with developing an understanding of the scientific method. It is recommended that:

teachers be encouraged to evaluate the whole process of completing a science fair project and to place less

emphasis on evaluating the end product i.e. the science fair project and presentation.

A final issue related to science instruction is the lack of familiarity of teachers with the prescribed and supplementary units in the B.C. Elementary Science Curriculum. Teachers who were using Materials Based Units and Supplementary materials were unable to specify which category the topics belonged to, despite the fact that the current curriculum has been prescribed since 1981. It is recommended that:

the Surrey School District find ways to familiarize teachers with the prescribed and supplementary units of the curriculum.

5.46 Participation in Science Fairs

Participation in the district science fair is optional. However, almost 60% of the responding intermediate teachers require their students to participate in the science fair. Some primary teachers also require students to participate in the science fair. While some authors and researchers in the literature do suggest mandatory student participation in the science fair most, including the NSTA, recommend that participation in science fairs be optional. Whether student participation in science

fairs should be required or not is an issue which is best dealt with at the school and teacher level, and would be dependent upon the objectives for the science fair. If one objective of the science fair is to enhance students' research skills then mandatory participation may be appropriate. If, however, a major goal is to provide a challenge to those students with a keen interest in science, then mandatory participation is probably not appropriate. It is recommended that:

schools and teachers evaluate the issue of mandatory student participation in science fairs with respect to their objectives for the science fair.

Another aspect of the participation issue is the amount of assistance, support, and evaluation that students receive in completing their science fair project. Teachers appear to treat science fair projects as an extra activity yet many teachers require science fair participation. Many teachers also use science fair evaluations for a portion of the student's report card mark. Teachers who require participation and who use the science fair evaluations for a portion of the student's report card mark, should ensure that sufficient assistance and time is provided to ensure that students benefit from the experience. It is recommended that:

teachers who mandate student participation in science fairs should also provide assistance to students throughout the process of completing a project. Those teachers who cannot or are not prepared to provide this support should make student participation in science fairs voluntary.

5.47 Assistance to Students

Thelan suggested that the entire gamut of activities leading up to science fairs needs to be critically appraised (1964, p. 446). Castner also identified the need for more research into what type and amount of qualified assistance should be available to students in the completion of a project (1967, p. 502). The results of this study support these suggestions for further investigation. It is possible that teachers' treatment of science fairs as an extra activity may come from a lack of understanding regarding what kinds of assistance the students require. It is recommended that:

further study be conducted to determine what type and amount of assistance elementary students need to complete a science fair project satisfactorily.

5.48 Science Fair Inservice

Three quarters of the responding teachers reported that they would attend inservice about science fairs. Teachers listed topics that they would like to see presented at an inservice session. Teachers preference for the timing of the inservice session was expressed as inservice at a professional day, at a conference and at an after school workshop. It is recommended that:

the Surrey School District provide a series of inservice sessions about science fairs which emphasize the topics requested by teachers. Inservice topics identified in this study should also be addressed.

5.5 Concluding Remarks

The purpose of this study was to establish baseline data with respect to science fair organization and science instruction in the Surrey School District. Several recommendations regarding science fair organization, science instruction, and areas of further study have been presented. The researcher is hopeful that the data and recommendations will be useful to both the district and others who have an interest in the topic of science fairs. Given the apparent lack of empirical studies on science fairs and their increasing popularity in B.C., the

researcher thinks that further studies on the topic are justified.

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APPENDIX I

TEACHER QUESTIONNAIRE RESULTS

NOTE: There are minor differences in the wording between a few of the following questions and those found in the original questionnaire. This was done for the sake of brevity and does not affect the intent of each question. Those readers who wish to see the questionnaire as it was distributed to teachers are referred to Appendix VI.

1. How many years have you taught as of June 1985?
   0 years (beginning teacher) 4%
   1-5 years 9.6%
   6-10 years 25.9%
   10+ years 63.2%

2. Are you male or female?
   Male 48.7%
   Female 50.4%

3. What was the last level of science course that you successfully completed? (check one)

Grade 10.....	3.5%	University.. 1yr.	23.7%
11.....	6.6%	2yr.	21.5%
12.....	17.5%	3yr.	10.5%
		4yr.	13.6%

4. How often do you read science magazines and or books?
   Weekly..... 38.6%
   Monthly..... 21.5%
   3-6 times per year... 50.9%
   Never..... 3.5%
   Missing..... 1.3%

5. How often do you watch science programs on T.V. such as Nova, Nature of Things, nature programs etc.? (check one)
   Weekly..... 38.6%
   Monthly..... 18.9%
   3-6 times per year... 50.9%
   Never..... 3.5%
   Missing..... 1.3%

6. Did any pupils from your class participate in your school's science fair this year? (1985-86)
   Yes..... 94.3%
   No..... 4.4%

7. Have you attended any inservice activities relating to science fairs? (check all that apply)

No..... 61.8%

Yes A. What kind of inservice activity?

a) After school workshop..... 21.5%
b) Professional day workshop..... 14.9%
c) Workshop at a conference..... 11.0%
d) Other (specify)..... 3.5%

- presentation in class time
- in school
- planning meetings at the school
- we invited District Helping teacher to our school to make a presentation to pupils and teachers
- discussion group/ideas brainstorm after school. Burt Deeter's slide show
- staff meeting presentation
- after school meeting

B. Please specify topics about science fairs that you found useful.

- organizing science fairs in schools (9 comments)
- webbing; how to select topics (7 comments)
- slides of well presented projects (5 comments)
- list of previus topics (4 comments)
- ideas contained in the science fair booklets (2 comments)
- rules and regulations (2 comments)
- planning and awards
- how to help students begin scheduling
- all points re. display, ingenuity, what judges look for etc.
- Brian Hassen "Ideas", Burt Deeter "Air Pressure and Plastic Bags"
- short snappers, science planning
- presentation of information by participating student
- general ideas re. format, presentation
- experiments - all kinds
- coming up with fresh ideas and ways to display them; how to prepare for questioning
- motivating pupils; teaching 'presentation ideas
- construction of displays

8. Would you attend any inservice activities relating to science fairs if they were offered? (check all that apply)

No..... 25.4%

Yes A. What kind of inservice activity would you attend?

a) After school workshop..... 36.4%
b) Professional day workshop..... 55.3%
c) Workshop at a conference..... 43.9%
d) Other (specify)..... 2.6%

- (a) is least preferable
- at our school - Professional day (3 comments)
- during school - needs much more than a one hour after school session
- practical applications; split class demonstration lessons
- only if they were non-competitive or included group activities

B. Please specify topics about science fairs that you would like presented.

- motivating to encourage more experiments/original research (13 comments)
- how to generate enthusiasm; getting the pupils started (11 comments)
- evaluating projects; judges' expectations (8 comments)
- how to encourage new/unique and creative ideas (8 comments)
- how to set up/display projects to work and win (5 comments)
- integrating science fair into the curriculum (4 comments)
- how much parent help is allowed? (4 comments)
- Canadian contributions to science; names and ideas (4 comments)
- lists of topics across Canada (3 comments)
- motivation of teachers (3 comments)
- webbing; choosing topics (3 comments)
- how to properly present the science lesson; what are the techniques for questioning and having the students eager to do experiments or research?
- different types of B.C. trees; complete salmon travels
- magic garden; electricity
- categories
- how to introduce science fair to primary students; getting topics, how to do it in a simple way that is not overwhelming for younger pupils
- yearly highlight (like Halley's Comet)

- electricity, levers and pulleys
- getting children to use inquiry process well
- selling science fair to parents
- where to get cheap materials
- what benifits are accrued through working on science fair projects?
- video of winners from previous science fairs
- cost factor; how strict are we?
- evaluation of the worth of science fairs
- information about obtaining free materials
- individualizing the science curriculum
- encourage participation for participation sake rather than for competition
- whole class vs. volunteer attendance
- questioning; how to prepare background material
- locating supplies for those in need
- ecology; astrology

9. Are you teaching Science to an intermediate class (grades 4-7) this year (1985-86)?

Yes	90.4%
No	9.6%

10. Which one of the following best describes the grade you teach?

Grade 4	25.4%
5	21.9%
6	18.0%
7	22.8%
Special intermediate class	1.3%
Other	10.5%

11. For how many minutes per week on the average, did you teach science?

minutes	Sept.-Dec.	Jan.-Mar.
0	.9%	.4%
30	3.1%	2.2%
60	11.0%	10.5%
90	31.1%	28.5%
120	26.3%	26.3%
150	8.8%	10.1%
180	5.7%	8.3%
180+	3.9%	3.5%
missing	9.2%	10.1%

12. Was your class given extra in-class time to assist pupils in the preparation of their science fair projects during the months of January, February, and March, 1986?

No..... 44.3%

Yes How many minutes per week of extra in-class time did your pupils receive

minutes	Jan.	Feb.	Mar.
15	3.5%	3.9%	1.3%
30	19.3%	23.7%	20.2%
60	6.6%	11.4%	12.7%
120	1.8%	2.2%	4.8%
120+	.4%	.4%	1.2%

13. Did you assist any pupils with their science fair projects during out of school time?

No..... 46.5%

Yes A. Please estimate the total number of minutes per week which you assisted the pupils with their projects during out of school hours.

minutes	Jan.	Feb.	Mar.
15	11.8%	9.6%	8.3%
30	13.2%	18.9%	18.9%
60	3.5%	6.6%	7.5%
120	1.3%	.9%	1.3%
120+	.4%	.9%	2.2%

B. Please estimate the number of pupils which you assisted during out of school time.....1259 pupils

Comments:

- simple questions, resources, directions, rules etc.; on a school-wide basis
- this was voluntary at our school this year. My assistance was to: check their topic, provide resource materials, paper etc.; encourage and help out where necessary on an individual basis so it's difficult to estimate time.

14. For what percentage of time do you use each of the following teaching materials?

1 never 0%	2 occasionally 1-33%	3 frequently 34-66%	4 mostly 67-100%	5 missing

Teaching materials	1	2	3	4	5
Exploring Science text					
Sept.-Dec.(%)	8.3	19.3	22.8	26.8	22.8
Jan.-Mar.(%)	9.6	21.9	22.4	21.5	24.6
S.T.E.M./Focus on Sc.					
Sept-Dec.(%)	21.9	20.2	10.1	4.4	43.4
Jan.-Mar(%)	23.2	18.4	8.3	4.4	45.6
B.C.T.F. Lesson Aids					
Sept.-Dec.(%)	24.1	20.2	.9	.4	54.4
Jan.-Mar.(%)	24.1	17.5	1.3	.9	56.1
Your own units					
Sept.-Dec.(%)	5.7	26.3	18.0	17.5	32.5
Jan.-Mar.(%)	4.4	25.0	19.7	15.8	35.1
M.B.U. (prescribed)					
Sept.-Dec.(%)	25.9	11.4	6.6	3.5	52.6
Jan.-Mar.(%)	24.1	11.4	7.5	3.5	53.5
Supplementary materials					
Sept.-Dec.(%)	12.7	17.1	10.5	2.2	57.5
Jan.-Mar	13.2	15.4	8.8	3.1	59.6

M.B.U. (prescribed) Which ones?

Sept.-Dec.

Topic	Responses
- magnet	9
- salmon	8
- bat.& bulbs	6
- mystery powder	5
- mealworms	5
- air pressure	4
- astronomy	3
- forest ecology	3
- seeds	2
- magnifying	2
- comets	2
- weather	2
- bones	2
- rocks and chart	2
- peas and partic.	2
- small things	2
- earthworms	1
- brine shrimp	1
- space (Cen.Lib)	1
- volcanoes	1
- beach	1

Jan.-Mar.

Topic	Responses
- bat.& bulbs	5
- rockets	4
- salmon	4
- seeds	3
- energy	2
- mealworms	2
- mystery powders	2
- kitchen physics	2
- small things	2
- rocks and charts	2
- National Geographic	2
- How I Began	2
- earth,sun & season	1
- EYE Trees	1
- plants	1
- magnets	1
- tangrams	1
- microgardening	1
- musical instruments	1
- insects	1
- pill bottle chem	1

- mirror cards.... 1
- mealworms..... 1
- microgardening.. 1
- teeth..... 1
- Panda wildlife.. 1
- SAVI kits..... 1
- TOPS kits..... 1
- pill bottle chem 1
- rocketry..... 1
- crystal radio... 1
- Nat. Geog..... 1
- pendulums..... 1
- optics..... 1
- kitchen physics. 1
- Cdn. Wildlife F. 1
- owl..... 1
- Milliken mat.... 1
- plant..... 1
- pendulums..... 1
- graphic map..... 1
- solar system..... 1
- science fair mat.... 1
- Milliken materials.. 1
- EYE Senses..... 1

Supplementary materials. Which ones?

Sept.-Dec.

Topic	Responses
A/V materials...	5
bat. & bulbs....	4
comets.....	4
astronomy.....	3
living things...	2
rocketry.....	2
small things....	2
seeds.....	2
bones.....	2
forest/trees....	2
weather.....	1
energy.....	1
plants.....	1
colour.....	1
light.....	1
water.....	1
pamphlets.....	1
mystery powders.	1
science nifties.	1
magnets.....	1
fishing in B.C..	1
whales.....	1
Basic First Aid.	1

Jan.-Mar.

Topic	Responses
rocketry.....	6
astronomy.....	6
bat. & bulbs....	3
salmon.....	3
beach.....	2
crystal radio...	2
small things....	2
A/V materials...	2
owl pellets.....	2
mealworms.....	2
hatching chicks.	1
boomerangs.....	1
heat and temp...	1
magnets.....	1
pamphlets.....	1
birds.....	1
weather.....	1
comets.....	1
mystery powders.	1
plants.....	1
energy.....	1
machines.....	1
graphic map.....	1
science fair....	1
seeds.....	1

15. How often did you involve your pupils in the following activities/approaches in your science classes?

1 never
2 once or twice in 3-4 months
3 once or twice a month
4 once or twice a week
5 almost every class
6 missing

activity/approach	1	2	3	4	5	6
a) carrying out experiments from instructions						
Sept.-Dec.(%)	12.7	36.0	28.5	9.6	1.3	11.8
Jan.-Mar.(%)	11.0	33.8	29.8	10.1	3.1	12.3
b) making up own experiments						
Sept.-Dec.(%)	43.9	34.2	8.3	1.8	0.9	11.0
Jan.-Mar.(%)	37.3	33.8	11.8	3.5	0.9	12.7
c) listening to teacher's explanations						
Sept.-Dec.(%)	2.6	6.6	19.7	45.6	14.0	11.4
Jan.-Mar.(%)	2.6	7.5	23.2	40.4	13.6	12.7
d) interacting with the teacher in a mix of questions and explanations						
Sept.-Dec.(%)	1.8	1.8	17.5	41.7	26.8	10.5
Jan.-Mar.(%)	1.8	2.6	18.0	37.3	28.1	12.3
e) classifying objects/events						
Sept.-Dec.(%)	5.7	32.0	33.3	14.9	0.9	13.2
Jan.-Mar.(%)	8.3	30.3	31.6	12.7	1.8	15.4
f) answering questions from worksheets/textbooks						
Sept.-Dec.(%)	7.5	16.2	31.6	28.5	3.9	12.3
Jan.-Mar.(%)	8.8	15.4	34.6	25.0	3.9	12.3
g) copying notes						
Sept.-Dec.(%)	14.5	26.3	30.7	14.0	3.5	11.0
Jan.-Mar.(%)	14.0	27.6	31.1	11.8	3.1	12.3
h) watching A/V presentations						
Sept.-Dec.(%)	6.6	23.7	48.7	9.6	10.1	11.4
Jan.-Mar.(%)	6.6	24.6	46.5	9.6	0.0	12.7
i) memorizing						
Sept.-Dec.(%)	30.7	31.1	18.9	4.8	2.6	11.8
Jan.-Mar.(%)	29.4	31.1	18.9	3.9	2.6	14.0
j) preparing for experiments to be conducted at home						
Sept.-Dec.(%)	32.5	34.6	18.0	0.9	0.4	13.6
Jan.-Mar.(%)	28.9	32.9	18.4	3.9	0.9	14.9
k) reading from texts						
Sept.-Dec.(%)	5.3	17.1	23.7	33.8	9.6	10.5
Jan.-Mar.(%)	6.1	20.6	21.9	31.1	7.5	12.7
l) library research						

Sept.-Dec.(%)	8.8	38.6	34.6	5.3	0.4	12.3
Jan.-Mar.(%)	8.8	34.2	31.1	12.3	1.3	12.3
m) listening to guests						
Sept.-Dec.(%)	63.6	19.7	2.2	0.0	0.0	14.5
Jan.-Mar.(%)	60.6	20.6	3.1	0.4	0.0	15.8
n) going on fieldtrips						
Sept.-Dec.(%)	53.1	31.1	1.3	0.0	0.0	14.5
Jan.-Mar.(%)	42.5	41.2	2.6	0.0	0.0	13.6
o) computer assisted instruction						
Sept.-Dec.(%)	71.1	7.5	4.8	3.5	0.4	12.7
Jan.-Mar.(%)	68.4	6.6	6.6	4.4	0.4	13.6

16. Throughout the 1985/86 school year, what provisions were made for individual differences among your students in your science class? (check all that apply)
    a) no special provisions..... 58.3%
    b) individualized programs..... 7.0%
    c) achievement grouping within the class..... 12.3%
    d) special interest groups..... 20.2%
    e) other (specify)..... 4.8%
        - units were planned to meet the needs of students in the class. Students complete tasks at their level of ability.
        - let those who were interested do individual projects
        - work is designed so that all can contribute and participate
        - same material was taught, lower students had easier experiments, less research. Quizzes were sectioned into low, average and above average - bonuses were awarded
        - different assigned work for some students after group instruction/activity
        - only during science fair
        - individual differences are expected to be cared for in the depth of experimentation carried on by individual/group/class
        - all experiments were done with partners or groups so students could help and learn from each other. All assignments were done this way too
        - except self-directed studies for the science fair
        - work is designed so all students can contribute and participate. Assignments are open-ended
        - assignments were by selection of choices to suit individual strengths and weaknesses, i.e. choice of four ways to do project
        - we try to carry through with questions that come up and seem interesting

- open-ended assignments that allow for individual differences
- modified work load
- enrichment activities/centres
- different expectations; different questions orally
- individual projects
- they were all close in ability this year
- extension activities; "challenge" levels offered at stations and as course work

17. Does student participation in science fairs provide for the individual differences of your pupils?
No..... 17.1%
Yes..... 70.2%
missing..... 12.7%
Comments
- the 'slow' ones never win!

18. How many pupils are there in your class?
5 850 pupils (total for questionnaire)

19. How many pupils from your class completed a science fair project?
4 827 (82.5%) pupils (total for questionnaire)

20. In my class:
a) All pupils are encouraged to complete a science fair project..... Yes 80.7% No 4.8% Missing 14.1%
b) All pupils are required to complete a science fair project..... Yes 59.2% No 30.7% Missing 10.1%

21. Did you provide activities and/or resources to assist your pupils in doing a science fair project?
No..... 10.0%
Yes: Please check those activities and/or information that you provided (check all that apply)
a) pupil information booklet..... 76.7%
b) teacher information booklet..... 54.8%
c) previous science fair slides (C.M.C.)..... 57.5%
d) previous science fair slides (your own)..... 21.9%
e) filmstrips..... 23.2%
f) Helping Teacher presentation..... 22.0%
g) discussion..... 77.6%
h) wall display of how to do a project..... 41.7%
i) wall chart of pupil progress..... 27.2%
j) presentation by other person..... 18.4%
(specify)
- our principal did all this for those students participating

- teacher-librarian assistance (6 comments)
- several older students told of their past presentations (4 comments)
- teacher in charge of science fair (5 comments)
- class presentation of science project (2 comments)
- assistant principal makes a presentation to all classes (2 comments)
- materials for projects; written or other
- another teacher
- pictures of past projects

k) other (specify)..... 3.5%
- library books
- examples of good projects
- explanations
- display of ribbons won by my son and daughter
- own information sheet, own models, prepared lessons
- materials needed to do project
- we practiced public speaking and role-modelled presentations
- information to parents
- timeline from January to March
- lettering classes

22. Which of the following activities and/or resources would you use if they were available? (check all that apply)
a) video of how to do a project..... 81.6%
b) video of pupil presentation..... 71.1%
c) exhibits from previous science fairs..... 62.7%
d) none..... 3.5%
e) other (specify)..... 1.3%
- our school doesn't have a video recorder
- if every student could see the exhibits at Guildford it would be an immense help
- student presentations of how they went about organizing for science fair
- how to choose a project seems to be very difficult for many students
- detailed examples of exhibits that fit into different categories (most done are research type projects)
- doing a sample with the class
- posters, booklets
- choosing one's own project rather than relying on what's been done in the past

23. Are science fair project evaluations used for reporting pupil progress in science?

No..... 21.1%

Yes A. What percentage of the report card mark did the science fair project evaluation contribute for the reporting period January-March 1986?

10%	20%	30%	40%	50%	60%	70%	80%	80-100%
4.4	16.2	21.1	11.8	14.0	0.4	0.4	0	0

missing.....10.5%

B. Who evaluated the project for the report card mark? (check all that apply)

a) pupil self evaluation..... 11.0%
b) teacher only..... 33.8%
c) judge only..... 3.1%
d) both teacher and judge..... 32.9%
e) other (specify)..... 6.6%
- teacher and fellow students (9 comments)
- projects were presented first to the class; class evaluation (5 comments)
- was not used for report card
- three other teachers (primary) helped judge
- two teachers
- a separate report card mark is given
- pupil evaluation
- not part of report card mark

C. Which of the following were used to evaluate the science fair project for the report card mark? (check all that apply)

a) display..... 61.8%
b) pupil presentation to class..... 47.4%
c) pupil presentation to teacher (individual).... 25.4%
d) pupil presentation to judge..... 21.5%
e) completion of project..... 57.5%
f) District judging criteria..... 34.2%
g) each step in process of doing project..... 12.7%
h) other (specify)..... 2.6%
- pupil presentations were excellent. Students learned a lot from one another
- selection from gym display
- what benefits from doing the project the students perceived as being valuable
- French, written
- research, written form
- since the science fair is a voluntary activity, it is not considered in the term work. Instead, it is an individual grade reported in the second term only.
- ability of child

- content
- was not used for report card
- some steps from 'g' and individual effort was stressed.
- individual effort and individual accomplishments as they relate to ability or disability

24. TEACHER ASSESSMENT OF SCIENCE FAIRS

1....agree very much
2....agree somewhat
3....agree very little
4....disagree
5....missing

1. Science fairs stimulate the students to work beyond what is covered in class.

1	2	3	4	5
58.8%	31.6%	4.4%	2.2%	3.1%

2. Science fairs help students develop poise and self confidence.

1	2	3	4	5
39.0%	47.8%	6.6%	3.5%	3.1%

3. Science fairs provide students with chance to gain practise in research.

1	2	3	4	5
56.1%	32.0%	6.1%	1.8%	3.9%

4. Science fairs allow students to work independently.

1	2	3	4	5
56.6%	32.0%	6.6%	1.8%	3.1%

5. Science fairs teach students to be thorough.

1	2	3	4	5
28.1%	48.2%	14.5%	5.7%	3.5%

6. Science fairs promote an understanding of the scientific method.

1	2	3	4	5
18.0%	49.1%	24.6%	4.4%	3.9%

7. Science fairs help meet other students with like interests.

1	2	3	4	5
19.7%	46.1%	23.7%	6.6%	3.9%

8. Science fairs introduce students to adults with like interests and knowledge in science.

1	2	3	4	5
20.2%	36.0%	31.1%	8.3%	4.4%

9. Science fairs are useful in focussing the role of science in education.

1	2	3	4	5
36.0%	39.0%	17.5%	3.9%	3.5%

10. Science fairs provide the students with earned recognition.

1	2	3	4	5
52.6%	34.6%	6.1%	3.1%	3.5%

11. Science fairs allow the students to work cooperatively.

1	2	3	4	5
39.0%	43.9%	11.0%	2.6%	3.5%

APPENDIX II

PRINCIPAL QUESTIONNAIRE RESULTS

NOTE: There are minor differences in the wording between a few of the following questions and those found in the original questionnaire. This was done for the sake of brevity and does not affect the content of each question. Those readers who wish to see the questionnaire as it was distributed to principals are referred to Appendix VII.

1. How were pupils selected to represent your school at the District science fair?
   a) They were selected as winners from the school science fair..... 88.5%
   b) They were selected from one or more individual class science fairs..... 3.8%
   c) No pupils from my school were at the District science fair..... 5.8%
   d) Other (specify)..... 1.9%
      - Our school does not participate in the fair
      - begun at classroom level; 25% of entries from each room then qualify for gym.
      - mini-fair was held for class winners. All staff voted for school reps.
      - however, the Firsts in the school were not necessarily selected to represent the school.
      - "Outstanding" entries (rather than "winners")
      - grades 4-7 were awarded 1st, 2nd, 3rd in each grade. Top three in school went to Guildford

2. Which of the following best characterizes the viewing of your school's science fair projects? (check all that apply)
   A. The public are encouraged to view the projects during
      a) The day only..... 26.9%
      b) The evening only..... 21.2%
      c) Both day and evening..... 48.1%
      d) Other (specify)..... 0.0%
      e) Missing..... 3.8%
   B. All projects are viewed in one or two large areas (gym, library, etc.)..... 67.3%
   C. Projects are viewed only in classrooms..... 5.8%
   D. Projects are viewed in the classrooms with the best from each class viewed in one large area..... 28.8%

3. Pupils from which grades participate in the school science fair? (check all that apply)
   a) Grades K-7 in one science fair..... 46.2%
   b) Grades K-3 and 4-7 (two separate fairs)..... 25.0%
   c) Grades 4-7 only..... 15.4%
   d) Other (specify)..... 11.5%
      - however, at the same time primary are doing similar things but not as a fair
      - there is no further competition in primary grades- "special merit" winners display projects in the library
      - however, only grades 4-7 were judged. The primary children have a person to comment on their projects.
      - K-3 voluntary, 4-7 compulsory
      - 2-7 individual projects or pairs; grade 1 same or as class project
      - school wide open house, science theme
      - 4-7 pretty well every pupil, K-3 not emphasized- pupils interviewed but not formally judged
      - grade 3 had a separate fair
      - grades 4-7 with voluntary participation from individual primary classes
      - grades K-3
      - grade 7 only this year

4. Pupils from which grades are required to participate? (check one)
   a) All pupils K-7 are required to participate..... 11.5%
   b) All pupils 4-7 are required to participate..... 30.9%
   c) Only pupils from some classes are required..... 25.0%
   d) Pupils participate only if they are interested. 26.9%
   e) Other (specify)..... 1.9%
   f) Missing..... 3.8%
      - most from 1-7 took part; no K's took part
      - up to homeroom teacher
      - with some pressure from their teachers
      - changed for 1986/87; required for 4-7
      - not all primary classes were involved
      - we have done it both ways. This year it was voluntary. Some kids put negative pressure on others resulting in many not participating that would have if it was mandatory. We are considering making it a requirement next year.
      - or may do comparable written project

5. How many classes participated in the school science fair?..... Total= 560

6. How are projects selected for the school science fair?
   A. Every project is entered in the science fair... 69.2%
   B. Only the best projects from each class are selected for the science fair..... 30.8%
      1) The best projects are selected by:
         a) teachers..... 32.7%
         b) peers..... 7.7%
         c) secondary students..... 5.8%
         d) parents..... 7.7%
         e) community members..... 9.6%
         f) School District officials..... 9.6%
         g) university students..... 1.9%
         h) other (specify)..... 1.9%
            - relatives of teachers, former teachers
            - don't advise using parents from same school
            - senior citizens

7. Who selects projects to represent the school at the District fair? (check all that apply)
   a) teachers..... 69.2%
   b) peers..... 3.8%
   c) secondary students..... 17.3%
   d) university students..... 0.0%
   e) parents..... 25.0%
   f) community members..... 40.4%
   g) School District officials..... 38.5%
   h) other (specify)..... 13.5%
      - Department Heads from Jr. Secondary school
      - Kwantlen College staff
      - Helping Teachers
      - winners of school science fair

8. Who receives awards at the school science fair? (check all that apply)
   a) all pupils receive participation ribbons/certificates/buttons etc..... 92.3%
   b) pupils in each grade receive First, Second, Third, Outstanding/Excellence awards..... 50.0%
   c) pupils in each category receive First, Second, Third, Outstanding/Excellence awards..... 11.5%
   d) Only pupils selected to represent the school at the District fair receive First, Second, Third, Outstanding/Excellence awards..... 34.6%
      - many others receive Honourable Mention certificates
      - Finalist ribbons for those going to District fair

9. How many regular classes (K-7) are in your school?
   a) 1-4 classes..... 1.9%
   b) 5-9 classes..... 23.1%
   c) 10+ classes..... 73.1%
   d) Missing..... 1.9%

10. PRINCIPAL ASSESSMENT OF SCIENCE FAIRS

1....agree very much
2....agree somewhat
3....agree very little
4....disagree
5....missing

1. Science fairs stimulate the students to work beyond what is covered in class.

1	2	3	4	5
63.5%	26.9%	3.8%	1.9%	3.8%

2. Science fairs help students develop poise and self confidence.

1	2	3	4	5
46.2%	46.2%	3.8%	3.8%	1.9%

3. Science fairs provide students with chance to gain practise in research.

1	2	3	4	5
50.0%	36.5%	7.7%	3.8%	1.9%

4. Science fairs allow students to work independently.

1	2	3	4	5
48.1%	42.3%	1.9%	5.8%	1.9%

5. Science fairs teach students to be thorough.

1	2	3	4	5
28.8%	51.9%	11.5%	5.8%	1.9%

6. Science fairs promote an understanding of the scientific method.

1	2	3	4	5
21.2	50.0%	19.2%	7.7%	1.9%

7. Science fairs help meet other students with like interests.

1	2	3	4	5
19.2%	55.8%	19.2%	3.8%	1.9%

8. Science fairs introduce students to adults with like interests and knowledge in science.

1	2	3	4	5
17.3%	46.2%	28.8%	5.8%	1.9%

9. Science fairs are useful in focussing the role of science in education.

1	2	3	4	5
44.2%	32.7%	17.3%	3.8%	1.9%

10. Science fairs provide the students with earned recognition.

1	2	3	4	5
63.5%	25.0%	7.7%	1.9%	1.9%

11. Science fairs allow the students to work cooperatively.

1	2	3	4	5
38.5%	50.0%	5.8%	3.8%	1.9%

APPENDIX III

GENERAL COMMENTS: TEACHER QUESTIONNAIRE

The Science Fair is the only academic event for elementary pupils -everything else is sports orientated. I have found that teacher enthusiasm has waned over the years. Most finding it a bother, which is sad because science fair allows pupils to explore things that interest them. However, I find it unfortunate when (rumor has it) that some teachers only allow certain categories so that the pupil can win! I hope science fairs continue. They are great!

I have noticed that Science Fair offers academically inclined students an opportunity to shine. We often showcase school athletics but not the academics. Also I have followed three students whose projects are always superior. They are always chosen to go to Guildford, however these students are not necessarily top academic students in their regular classroom assignments.

To my knowledge Surrey's Science Fair is famous for it quality projects and massive participation. It is an event which brings the student, his or her family and the school closer together. I have enjoyed the positive feedback I receive from the students and parents. The science fair is an academically oriented activity which links the school and the community in a sole endeavour -scientific pursuit! In this day and age when education is under such a negative deluge from politicians and tax payers, it is comforting to announce to those who ridicule the system the success of events such as the Surrey Schools Science Fair. Please don't let it die. Keep up the excellent work, Burt and all your co-workers who keep it going!

Excellent resource help. School outline from Helping Teacher helpful. Communication about dates etc. excellent. I enjoy doing it each year and appreciate all the work you do Burt. Thank you.

I am very pleased with efforts being made by district staff to improve the calibre of school science fairs. I think anyone teaching in Surrey should be proud of our district's accomplishments in this area.

Good work, Burt!

Excellent. Well organized. Much appreciated.

I think our school and district science fairs are excellent in both format and execution. Everyone who is involved deserves accolades. There will always be small problems when a venture for this size occurs, but apart from finding fifty more judges (an impossibility) I think everything works great! Anyone who knocks Science Fair is a jerk.

As with many events, it is not always easy to motivate pupils or parents and teachers of these children who would benefit greatly from the experience. Those who do participate appear to gain from the experience. I appreciate the organizational task and congratulate those who put it together.

Even though the organizing is a chore and many negative comments surface, I think Science Fairs at the individual and district level are "good". One of the best learning experiences I have discovered, occurs the day after the fair when we view, as a class, primary and intermediate exhibits. Classes should be encouraged to keep a chart from September listing ideas for Science projects. Personally, I think projects should be mandatory for intermediate pupils . . . at least a written report if not a project.

This is the first year that our school did not organize a science fair. We put our energies and time into a full school play production. Both students and parents expressed feelings of missing the annual science fair. For this reason, find it hard to fill out this form. The school community strongly supports the school science fair.

Although some children did a fantastic job of setting up their own experiments I now realize there was a real void in my science classes in this area which I would try to correct next year. All our experiments were the suggested ones in the text or modifications of my own.

Science Fairs promote better quality projects as students see good projects then remember those for the next year and aspire to achieve a better quality than the previous years.

The true focus of Science Fair to me is that students show the public what they can create -it's communication between the young and adults where the young has a chance to show and tell their gained knowledge of a project. The image is very positive but also in a field that the general public seems to be non-confident about. Creativity is just not part of the Arts.

Students enjoy the opportunity to share their knowledge. It also gives them an opportunity to practise some public speaking.

Three years ago, Justin Brown from my classroom did extremely well in both the Surrey and Vancouver Science Fairs. His project dealt with a laser. Thanks for making the Surrey Science Fair an ongoing thing.

Strong supporter of Science Fairs! Had some entries in Regional Science Fair and would like to encourage more next year -would like to see District support etc. in this area. Strong believer in workshop for parents, at the school level, for Science Fair slide show and talk is sufficient

Good P.R.

We have enjoyed the Science Fair. There has been considerable discussion about whether it should be compulsory or voluntary for next year. Also should it be every 2nd year.

I find Science fairs very worthwhile to the student as well as for the public.

I think that Science Fairs are a valuable educational experience. From my own experience as a parent in Langley with a 7 year old who participated for the first time, I was proud at the sophistication of the projects at both the primary and intermediate level at my school compared to what has happened at my son's school. Surrey has put a lot of work into making Science Fair the success it is, and I'm all for it continuing. A good start in the Primary grade has made Science Fair at our school an important, exciting learning experience. Keep up the good work!

The new grade 4 Social Studies program has somewhat upstaged my regular science program and hopefully there will be a balance next year. Thank goodness for Science Fair! We look forward to it every year.

I love Science Fair. It's great!

I think it is great to have parents involved in working with their children. It has many positive rewards, however in some cases it is all done by parents.

I am, and always have been, a very strong proponent of Science Fair. I believe that Science Fair can do more for the attitude towards Science than any teacher standing at

the blackboard. I also believe your department has done an excellent job at Science Fair.

These projects often bring parents to work with and get involved with their child's work.

Thought it was an extremely worthwhile and valuable learning experience for us all. Realize they need much more help in how to organize and present their research display etc. A video or slides on how to do this would be extremely useful. I think I would now hold my own mini science fair in the September to December period so they have a better understanding of the requirement etc. I did go over with them the importance the knowledge of their project would play in their assessment, in class as well as in the judging.

I asked the children what they thought were the advantages and disadvantages of having a science fair. All the children (including the non-particpants) thought the fair was a good idea. Their reasons were:

1. You could use your brain
2. There was an opportunity to investigate a variety of topics
3. You had a chance to work cooperatively
4. Confidence and ability to present a display improved
5. You could learn new things
6. You had the opportunity to observe other people's ideas
7. Your knowledge increased
8. It was fun

Pupil comments: We learned about things other people were doing. You learn as you go. Made Science more fun. Got my attention. Competition was hard on some who tried hard and "didn't win". Seven pupils have already started working on next year's projects.

Filmstrips and slides of how to do/display Science Fair projects should be presented in the fall, especially for the lower grades.

More inservice, workshops please!

I need a pamphlet or guideline to help me learn/teach about the scientific method and research procedures.

A videotaped presentation for teachers on preparing a class and students for science fair research and presentation would be helpful... more helpful than a workshop.

Teachers might be given more guidance in topics for students. I felt our school overdid the "Research" category, probably because it is the easiest for students to get started on and complete. I would find it helpful if the teachers were offered a workshop approximately 2 months before the scheduled Science Fair.

Science fairs are good, however too often they become the entire Science program. Also they are often used as the sole means of evaluating a student in science. I believe they should be used as enrichment for students rather than part of the curriculum.

Science fairs can be a very positive learning experience for pupils provided they do most of the research and other work themselves. However, I feel that science fairs have become so competitive that what we are seeing now is more of what mother and dad are capable of doing, rather than what the child is capable of doing. For this reason, I would like to see less competition for the honour of going to Guildford. Instead, I would prefer to see local shopping malls host each school in their area and send all projects from that school. I strongly disagree with the practice of some schools only allowing the "best" projects to be displayed in the gym. I believe science fairs should be voluntary much as extracurricular sports are voluntary.

May be time to divide Science Fair into north/south categories. School Science Fair remains one of our prime public relations vehicles. I do believe, however, that we alienate some of our constituents by not providing enough inspiration, information, assistance, guidance, etc. at school.

I usually use the Science Fair project as part of report card mark but didn't this year as a result of having a student teacher. I think Science Fair might be more useful later in the year. This way I have more opportunity to teach scientific method of investigation. Also students may have more and better ideas for science fair projects.

At our school many parents get involved in Science Fair. Some parents and teachers have voiced the opinion that a science fair every year is too much. They suggest every other year of two out of three years. By the time students get to Grade 7 they suffer from Science Fair burnout. I do not know how wide spread this feeling is. It does exist. I believe that Science Fairs serve a definite purpose and are worthy of support.

The Science Fairs have been very successful and I enjoy attending. I sometimes wonder if we should have a change. I hate making projects compulsory because so many of my students never get any help from home and few get to go to Guildford. How about a school project for a year i.e. one school does a specific topic from Grade 1 to Grade 7. Or have one major project from a whole class so that everyone in the class contributes. (e.g. Mobiles)

In my 3/4 split, the grade 3's were strongly encouraged to do a project, which they all wanted to and did. The projects they turned out were, in many cases, more carefully and completely done than some of my grade 4's. I realize that I have quite an exceptional class of basically top kids, but some of the best projects were not from just my top pupils, but from the others who put their hearts into these projects. The Grade 3's were basically judged in class by myself and 3 other teachers, after which parents came in to view them. The parents' comments were all very positive. Would it be possible to open it to grade 3's who wish to participate, and judge them as a grade 3/4 set? For my pupils, it was excellent practice for next year, but it would have been nice to include them in the gym presentation to the school, if possible.

The Science Fair at Guildford is far too short. Exhibits should be on display at least for the weekend. That amount of work and effort should not go unnoticed.

The public needs to be made more aware of the Science Fair. Too often kids at the fair get asked too few questions. Let's publish some guidelines in the local newspaper BEFORE the Science Fair, outlining for the public what to look for, what to ask etc.

We need to INVITE the public to come and participate.

Since I only teach science twice a week as well as eleven other subjects, I cannot spend much individual time with each student. I think it would be most beneficial to the science program to have one science teacher in each school to teach all intermediate classes.

I feel that Science Fairs have become too sophisticated in recent years. I think it is time to consider a science 'challenge' for awhile where students are given a challenge to try to solve using certain materials and a great deal of intuition.

I would like to see sections devoted to engineering problems. i.e. 1) straw tower building; 2) vehicles to

carry weight to cover distance given a basic supply list; 3) airplanes built using standard supply list; 4) bridge building. Feel this would provoke research and ingenuity.

What about "Olympics of the Mind" type of competition at Guildford. A problem solving activity for teams representing schools.

More guidelines should be given to judges, such as trying to avoid sexism or ageism.

The biggest complaint I have heard over the years, is not at the school level of competition, but at the district level. I would suggest having people who have science knowledge and not being so rigid on classification. A meeting with judges before the actual judging may help. This year I understand that judging was unduly long.

Judging can be a serious problem when teachers or/and parents, or/and students feel they should have had a better mark. They lose sight of the fact that involvement is more important than winning. Science Fairs are very hard on parents. I have heard of comments by parents such as: "I hope Mr. So & so does not have a science fair this year." many times. Suggestion: perhaps all science fairs should be made optional.

An ongoing concern. Who are we judging? The student or the parent's willingness to participate. I disagree with the "awards" end of the present system, unless we have two categories: 1) parent assisted and 2) student only. As this is very hard to monitor I question the whole 'award' system. Participation has its own merits.

Most children do not do the projects on their own. Many parents participate or do them for their youngsters. I think there should be group activities and projects. Projects should be done at school and not at home. Suggestion: a budget to schools for special materials. I believe the district could promote participation and excellence in science in other ways. A competition does not, in my opinion promote excellence.

Science fair projects should be parent/pupil oriented rather than being done in/at school. All pupils should do one project and it should always count towards report card mark.

I would like to see different guidelines established so that the projects kids produce are theirs, not their parents.

I always enjoy the Science Fairs and I think the students look forward to them as well. My only criticism is the problem of how much help some students receive at home and conversely how little help others receive. Because I use the projects for marks, I feel it should be all the students own work, building, labelling, etc. I feel the costs should be not what the pupil paid for it, but what the item would cost if purchased as a new item. If all the teachers were very strict about this, the Science Fairs would be much more "fair" to the average or below average income family.

It's time to raise the cost limits past $10.00

This was my first year teaching science at the 6th grade level, and due to a lack of confidence in the development of my program, I did not choose to have my pupils take part in the science fair. Perhaps another time when my comfort level has been raised, I will feel that I can have my class take part in a science fair.

What about work done after Science Fair (April June) which frequently promotes student interest for the following year's Science Fair?

Let's not get too serious about whole thing -Science "Fair".

We did not have a science fair this year because our fun night was schedule for that night. Next year we expect to participate.

Providing assistance and specific "How To" lessons throughout preparation time takes away from curriculum material to be covered. I am unsure as to the equitable value of time spent on specific preparation versus the value the students get out of it. The projects presented in my class (grade 4) do not reflect my efforts. School wide, the projects this year were poor quality. Perhaps compulsory every year does not bolster motivation.

I am cautious in my judgement as to the value of Science Fairs to the student. One has to ask who is doing the science project and how it is being done. For the most part, students do not seem to fully appreciate the methods of science. Most projects could easily be called a "collection of facts". Secondly, we must admit that we will never know how much work is the actual work of the student. If work is done at home, the teacher has lost control of the process. For these reasons I do not give a report card mark but I do recognize participation. And I do support

Science Fairs for the reasons given on the opposite side of this page.

If the scientific method could be done by the children and with less adult help, it would be more thought provoking. I always get the feeling it is a memorized study in many cases. I'd like to encourage simple thought provoking method with a display of observations and results. I'd like to be able to stimulate the growth of the children but haven't felt confident about it in the past

I think the last page was slanted towards a favourable response. Otherwise, it did help me get some good ideas on proceeding with next year's projects, i.e. scientific investigation, evaluation.

I like the idea of the Science Fair, but sense a general loss of interest each year by staff and students. Part of it seems to be the lack of new and exciting topics. Also, some teachers don't seem to like the competitive aspect of it. I also think students that do projects on their own get quite frustrated by students who receive considerable help at home and bring in the 'ringer' projects. I would like to see a few new ideas put into the Science Fair system just to increase general interest and motivation.

Lists of previous topics, slides, motivational chart etc. all helped to develop an interest and desire to do a project. (However, it was compulsory in my class.) The student and teacher booklet I find very helpful. I guess though a sound science fair begins with a sound science program, and maybe that is what causes my concern at the beginning (lack of materials etc, have not helped.)

Parent participation seems to be necessary to make it to the finals. I often wonder who did the most work...the parents or the children. This help isn't all bad as it provides a vehicle for parents to participate in something educational with their child. Projects frequently reflect the parents' occupation; should this parental help and background be acknowledged/recognized or ignored? Has become, to some, absurdly competitive i.e. complete projects redone days before Guildford finals. More stress on verbal presentation, at least among my school's children.

The Science Fair in our school causes much intrinsic interest in science. I find that some of the students have

chosen for their projects topics we have discussed in class and have expanded on them.

Finding time in today's varied curriculum at the Elementary level is difficult e.g. computers, etc. One becomes a "jack of all trades" so to speak, and therefore it is hard to do justice in all areas.

The children who participate seem to enjoy "Science Fairs" and it does give them an opportunity to work with their parents on projects which is often the case. Lack of classroom space makes it difficult to have 15 or more children working on projects.

You are very persistent!

Science Fair projects can become burdensome for parents with several children involved. My policy has always been to encourage every one in the class to become involved, but I sometimes wonder if this approach is valid. This year I am going to make the information available and show the class how to do the project etc. and encourage the "keeners" but not push the more reluctant ones. However, I do intend to have in class assignment/projects which all must do.

I hope you get enough data to serve your purpose and that it is useful to you, and useful to us! I'll be thinking of you this summer!

Re: question £15 C.A.I. Although my class does a great deal of computer work (140 minutes per week) we set up data bases (Socials), use the MODEM and explore LOGO rather than using C.A.I. software.

This is my first year teaching Grade 4. My class is a 3/4 split and the 4's did all my teacher based units in grade 3. Therefore I depended on a text this year more than usual. Also Socials took a higher priority as I was teaching two separate programs and learning a new one in grade 4. I think that Science, unfortunately, took a lower priority this year.

Science Fair is boring!...because it is repetitive. There is little recognition given to the vast majority of students who participate and one crowded night at Guildford has become far too chaotic rather than a positive experience. I would like to see science fairs become lower key with displays set up in a variety of shopping malls on a variety of days so that more people would be able to talk with the students, look carefully at the projects and

display a larger variety of projects to the public. Science Fair requires some serious rennovating!

Any workshops on Science Fair material should be held early enough in January to be of maximum benefit. Science Fairs should be held every other year, to give students, parents and teachers a break from what, in some minds, has become just another thing to get through.

If students were encouraged to work in cooperative groups on a project; if the project was completed by the students themselves; if everyone participating received the same "recognition"; then I would be more comfortable supporting the "Science Fair" concept.

If group projects were accepted we would participate only if all could participate. Choosing the "best" is contrary to our philosophy and is, we feel, counter productive in stimulating the interest and involvement of all not just a "select" group. Our goal is to have every child fascinated and involved with knowing about the world.

I find the idea of a Science Fair quite wonderful. However, it is too big, too many kids crowded together, no place for them to sit. Exhibits are very crowded. Lack of supplies in school has been a hindrance. Many complaints from parents re: pressure by pupils to help etc. Topics are becoming harder and harder to find an original idea. After viewing exhibits this year, I would give awards to parents. This year I felt the Science Fair had outlived its life and had comments from parents requesting a change of format, or eliminating it all together.

I find it somewhat reprehensible that our local school Science Fair has chosen to acknowledge the efforts of approximately the top 10% of entrants in each category with an Award of Excellence, whereas the Surrey District Science Fair persists in using the First, Second, Third, and Honourable Mention system. I am always amazed that this is used when in some of the larger categories it is not possible for all judges to see all the projects. Is the assessment of one judge deemed to be more accurate than that of others?

Because the parents are involved with the students in this project, the competition is not really fair. Children who have parents who are not interested or who haven't the talent to guide them are at a disadvantage. I favour a Science display with no awards such as 1,2,3, etc. just participation awards for all who enter and make a

creditable display. Otherwise, just have a Science Club in each school and each school can send an entry.

Science Fair has become "a drag" for many parents and children. It should be completely voluntary for a while (at present our students must participate.) There's a great deal of negative feeling in the community about Science Fair and this negative attitude is passed on to the children.

The Science Fair isn't very 'fair'. Rather it is a competition in which the kids who do well in everything else do well again. Rather than being a celebration of discovery, it tends to be for most "average" kids a rehash of old research, old library books and "chestnut demos" and experiments. I find it frustratingly hard to get most of the kids really turned on to the scientific as opposed to the competitive aspects of the whole thing. You really would have to juggle curricular time allotments to do Science Fair as a real fair.

The School and District Science Fairs are well run and are excellent educational experiences. However, there seems to be an over emphasis on the 'competition' factor resulting in a general feeling of 'disappointment' for all but the handful of successful students.

I do not know of a solution to this problem but each year I have witnessed the "Why did I try so hard?" attitude at both School and District Fairs.

Basically a good idea. But too many students receive too much adult and parent help. I have seen entire projects completed and the student knew nothing of its content. The parents have then become upset because their project did not win!

Science Fair, too big, too competitive. Very beneficial, but for very few.

SUMMARY

- academic event (3 comment)s
- allows students oportunity to explore own interests
- allows cooperation between parent and student (5 comments)
- excellent support from the District (3 comments)
- accolades (7 comments)
- class viewing of projects a good learning experience
- parents/students missed fair when it wasn't held
- showed deficiencies in science program, i.e. need for more experimentation

- increase in quality of projects for next year due to greater awareness
- good opportunity to communicate with young and old, public relations (4 comments)
- public speaking
- enjoyed, wothwhile (5 comments)
- encourages positive attitude
- children's comments:
  use your brain
  variety of topics
  cooperatively
  observe other projects
  made science more fun

Suggestions:
- slides, filmstrips on how to do a project presented in fall
- more support for participation in Regional Science Fair
- more inservice (3 comments)
- need assistance with the scientific method
- video of science fair research and presentation
- help wth selecting topics
- should be used as enrichment activity
- separate the District fair into smaller shopping malls (2 comments)
- science fair should be voluntary (4 comments)
- may be better later in year
- school/class project (5 comments)
- science fair every 2 years (2 commment)s
- include grade 3 as a grade 3/4 group
- display at Guildford is too short
- need to inform public of what to look for
- need to invite the public
- need science specialists in elementary schools
- science challenges/OM etc. needed (3 comments)
- more guidelines for judges
- judges should have science background
- eliminate awards due to heavey parent involvement
- provide a school budget for special materials
- all pupils should have to do science fair project
- projects should be done at home
- cost should be assessed at new value for everything
- raise cost to more than $10.00
- too much parental help in some instances (4 comments)

Comments
- did not participate due to first year teaching this grade
- no science fair this year but plan to next year
- time spent on science fair takes time from curriculum

- does not seem to foster an understanding of science methods
- would like to feel more confident about being able to stimulate experiments
- questionnaire provided some good ideas for next year
- lack of new ideas each year
- hard to find time to fit it in
- projects can become burdensome for parents with more than one student
- science took a lower priority this year due to the new Social Studies program
- science fair is too repetitive, too little recognition to majority of students, and is too chaotic
- too big, crowded, lack of school supplies, too much parental help
- the awards system is not valid in the larger categories
- awards not fair due to parent participation
- science fair isn't fair.Those who do well at other things also do well at science fair.
- too competitive (3 comments)

APPENDIX IV

GENERAL COMMENTS: PRINCIPAL QUESTIONNAIRE

The Science Fair is certainly a very effective P.R. tool in that it has a very high visible profile. On the whole the Fair conveys a positive message to the parents and other members of our community which is essential.

One of the major academic events of the year.

Science fair is an important major event at our school. Because it is a small school, it is simpler to standardize expectations, organize and execute. Issues such as report card grades, recognition of effort, prize structure and primary participation do not become major areas of debate it seems because of tradition, cohesion and community expectation. Science Fair provides one of several focus points for displaying pupil achievement and is a source of positive feedback for pupils and teachers. The District Fair is so large and complex but the pupils who go each year consider it worthwhile. I value the District event as well....

I am most pleased with Science Fairs at both the School and District level. Very well promoted and well done. Would like to see the Fair highlighted more prior to the displays at Guildford.

I think the idea is fantastic and so impressive. It is such a good learning experience for the children and great P.R. for Surrey Schools.

Perhaps winning entries could be made available to schools on a loan basis for short display periods, or set up in central places on a zonal basis for visitations by interested school groups. I believe that these displays could serve as a tremendous motivational source for interested science students, parents and teachers throughout the school year.

Arts, Science Technology Centre have mobile on portable display of some consequence and interest available to schools or for display at Guildford during the week of Science Fair.

There have been some questions raised by teachers and parents regarding the wisdom of having a Science Fair every year. How long can you keep up the enthusiasm for the same

thing. Should we be looking at a Science Fair every second year and having a Writing Fair, Social Studies project display as alternatives?

I feel that with the increasing demands being placed on teachers that Science Fairs should be every other year. Another possibility might be that the District be divided into two zones with each zone alternating every other year.

If the date of the Science Fair can be announced very early in the term it would help schools, when they plan their year, to avoid date conflicts.

The 'success' of the project is very much dependent on the knowledge and enthusiasm of the teacher. When the teacher has both, the students really benefit.

I wonder if the teachers who make a project compulsory and assign it as homework, do not do "harm" to students who otherwise may enjoy the process. How can we get these teachers to change? Since parents sometimes feel inadequate to help their child, can we also help them more? The only grumbles I ever hear about the Science Fair are from parents who feel they are solely "responsible" for the project (not at my schools,of course!).

To compete at a young age is not an educational goal of our school. We believe people should work together in a co-operative way. We find children have an inate desire to learn and that their enthusiasm can be sparked without resorting to competition and rewards. I believe the Science Fair has been a valuable public relations project for the school district but is it really necessary? I have been told that too often children do not work independently but rather involve parents in developing their projects. Perhaps if class projects were done and the work was done in class, by the pupils together, without prizes as the ultimate goal, we might participate.

This year we decided to enter Science Fair alternate years only. While we had some concerns about parental or pupil response to this, we felt that many parents, especially those with two or more pupils in elementary, probably found Science Fair, year after year, a little trying. This proved the case. For some 400 pupils we received not one negative comment about the proposal.

We hope, after a year off, that both parents and pupils will view participation and attendance at the Fair with renewed interest and excitement.

Another problem we found was that often the best projects, i.e. those to go to the District Fair, were submitted by pupils who'd gone the year before. Since most successful entries are from grades 6 & 7 alternating the years of participation should correct this.

Science Fairs are very successful only when you have interested staff.

We have removed a potent "negative" from our fair and that is the 1st, 2nd, 3rd, 4th ribbons. Each project is so very different it is all but impossible to put them on a gradient. The subject and the energy required to complete each is too fluid.

We have chosen to simply recognize a job well done with a standard ribbon "finalist". A student has completed the work he set out to do in a successful way.

The display of projects are always a physical organizational problem.... will work towards school made display tables.

Parents in the last two years have expressed concern about the general expectations of teachers for students (grades 4 to 7) to do most of the work on their own. They believe there is too much pressure and very little teaching of the different procedures; especially the experimental design. Several have asked it to be voluntary for all grades.

These concerns have been discussed by the staff and greater efforts will be made to prepare intermediate pupils. However we will continue to make it compulsory for intermediate. Science Fairs are a very good tool to promote the abilities of pupils (P.R.).

This year we received more concerns from parents than any other year. The concerns expressed were: (1) the compulsory aspects: (2) judging: a feeling that parents' influence affected the outcome. We are considering changing our format. Perhaps it is time to consider other alternatives.

Science Fairs in most schools have been going for so long that perhaps they have lost some of their stimulus When pupils have participated in a Science Fair from K to 7, by the time they get to grade 7 a lot of the pupils are rather bored with the whole process. I don't know what the answer is, but I think we may be spoiled by being too successful.

You caught us in our off year. We have promoted a school-wide Science Fair approximately every 2nd year. This year one teacher new to staff wished to participate and did.

Parents are overly competitive.

The problems with the Science Fair are the following:
(a) it tends to hog a lot of time no matter how it is organized,
(b) the competition is unfair since some pupils have more talented parents than others,
(c) the parents often complain about the burden thrust on them annually.

The Science Fair as it is now gives too strong of recognition to the winners, i.e. first recognition at the school level, second recognition by being at the District Fair, third recognition in the mall at 9:00, fourth recognition at the School Board Meeting. This over abundance of recognition results in a drastic and often unhealthy need to win. Coupled with the child's desire for recognition there is also the parents' need for success. Because of the nature of the fair (child and parent working together) any recognition, or lack of, results in ill feelings. Many parents spend inordinate amounts of time and energy on the project. If not successful they take it as a personal affront and attack their child for not performing correctly, the judges for not being fair, uninformed, prejudiced etc., the winners for cheating and the school for logistics, lighting, location, etc. Instead of being a science fair it becomes a battle of egos and everyone, especially the children lose. The winners, besides being lionized, are also subjected to vocal harassment on being chosen. What initially was a program to enhance the unity and image of the school and community has now developed unfortunately, into a devisive program that pits parent against parent, teacher against teacher, child against child and in some cases, is viewed by the parent school against school. For example Mr. "x" must be a wonderful science teacher because some of his pupils won or school "x" must have a strong science faculty because....

From parents:

Please don't make it compulsory, with 2/3 kids it becomes a terrible strain to find 14-21 ideas over 7 years.

I hope he/she didn't win. I can't stand the crowd and long hours at Guildford (from a few previous contestants at Guildford)

He/she entered eagerly but was disillusioned over the strain of being judged and competing against friends.

We have more family squabbles over Science Fair.

Teachers are damned if they do make it compulsory and regarded as uninterested if they don't.

In conclusion, a science fair can be a valuable tool, however, it must be used carefully. Elimination of judging could be a start. I understand the senior highs have an industrial arts display at Guildford without judging.

Limitation of space makes it difficult to allow all participants to go to Guildford. However, allowing only 2 grades (6&7) to enter may help. Teacher and parent consultation could eliminate (if indeed we want to) any less than satisfactory projects.

Down playing the winning aspect and encouraging the scientific interest would I am sure also eliminate many projects.

I give full credit to the people who donate their time and energy to the fair but feel we have spawned a monster and it must be put to rest.

SUMMARY

- display pupil achievement
- positive feedback
- good learning experience
- great public relations (3 comments)
- would like to borrow display of winning entries
- ASTC display
- every 2 years? (4 comments)
- announce date earlier
- class projects instead of individual ones
- compulsory issue (2 comment)s
- success depends on enthusiasm/knowledge of staff (2 comment)s
- non-competitive school
- physical set-up a problem
- using a 'Finalist' ribbon only
- loss of enthusiasm by the time students are in grade 7
- no 1,2,3, awards any more
- parents too competitive (2 comments)
- too much recognition to winners
- too much parental involvement
- eliminate judging
- takes too much time

APPENDIX V

SURREY ELEMENTARY SCHOOLS SCIENCE FAIR
BACKGROUND INFORMATION

School District 36 (Surrey) initiated a district science fair in 1966 (21 years ago). The fair was initiated by Mr. D. Lintott. In 1972, Mrs. Bev. Myers, Supervisor of Instruction, assumed responsibility for the science fair and continues to organize it today. The science fair is coordinated by the School District Curriculum Helping Teacher (Science). Assistance and advice is provided to the Supervisor and Helping Teacher by a committee of volunteer teachers. The Science Fair Committee meets once or twice each year to discuss issues, to provide suggestions, and to review the responsibilities of each committee member during the district science fair. The size of the committee varies from year to year. In 1986, there were 18 teachers on the committee.

The science fair is located at Guildford Towncentre shopping mall. Guildford Towncentre has provided significant support and assistance since the inception of the science fair. In addition to providing the location, Guildford Towncentre hosts a reception and dinner for the science fair committee and the judges, provides staff for the clean-up after the science fair and at one time, provided prizes for the first place winners.

The science fair is held on the Friday which is closest to the middle of March. This provides students with two months to complete their science fair projects prior to the school science fair. Most schools have their school science fairs between the day before the district fair and up to two weeks before the district fair.

Projects are brought to the science fair immediately after school on the Friday of the fair. During that day the Helping Teacher and three science fair committee members set up the tables and signs in preparation for the students' arrival. The students, provided with maps of the mall before they leave the school, know the location of each project category in the mall. When the students get to their area, one of the science fair committee members assists them with setting up their project. The committee member also tries to make them feel at ease and answers any questions the students might have. The students are expected to remain with their projects for the whole evening until the awards are announced. After the awards ceremony the students take their projects home. There are no further displays of the projects except for the first place winners who present their projects to the Board of

School Trustees at one of their meetings soon after the science fair.

Students enter projects in one of eight categories:

(a) Working models
(b) Static models
(c) Demonstrations
(d) Research
(e) Experimental research
(f) Outer space
(g) Canada's contributions to science and
(h) Collections and classifications.

The students must follow the rules which are the same for all categories. A set of definitions is provided for each category to assist the students in determining which category their project will be entered in. In some instances, a project is eligible for entry in more than one category. The students then may make the choice of which category he/she would like to be in. Students are encouraged to use the category definitions to assist them with the initial selection of a topic or project. Students may enter a project individually or in pairs.

Judging takes place between 6:00 and 8:15 P.M. The judges are requested to attend a meeting at 5:30 P.M., where they are reminded of the judging procedures, awards, and timelines. Each judge is assigned to a category and adjudicates up to 20 projects. A First, Second, Third and Honourable Mention prize is awarded by each judge. In the categories where there are more than 20 entries, two or more judges are assigned to that category and the projects are evenly divided among the judges. Each judge awards a First, Second, Third and Honourable Mention within his/her section of projects. Judges are provided with a general list of items to consider in judging the projects. Most judges refer to the list, but they are not required to do so. The suggested list is:

(a) knowledge (10 marks)
(b) resourcefulness and appropriateness (5 marks)
(c) visual impact (5 marks)
(d) uniquiness (5 marks)
(e) experimental design (5 marks experimental research category only)

Judges are invited from a variety of areas of the community. Representatives from the Municipal Council, Board of School Trustees, Superintendent of Schools, Secondary Science Department Heads, Faculties of Education from U.B.C. and S.F.U., Surrey Teacher's Association, Arts Sciences and Technology Centre, and Kwantlen College Science and Technology staff participate. Since some of the projects are completed in both French and English, one bilingual judge participates from School District Staff. This judge interviews those students who wish to be

interviewed in French. These interviews do not contribute to the judging for the awards and they are not conducted by the same judge who will be deciding the awards for these projects.

All students who enter projects at the district science fair receive a rosette 'Finalist' ribbon and a certificate. The winners also receive a 'Placement' rosette ribbon and a book. All winners receive the same book.

Due to the size of the Surrey School District (65 elementary schools), the number of entries in the district science fair is restricted. This is implemented according to school size. Table V.1 shows the allotment of projects.

Table V.1 Science Fair Project Allotment

Intermed. Classes	Projects Allowed
< 5 classes	3 projects
5-7 classes	4 projects
8-10 classes	5 projects
> 10 classes	6 projects

Schools decide which projects will be entered in the District science fair. Because the number of projects entered is pro-rated according to school size, and the total number of Surrey schools is known, the maximum number of projects that will be entered can be predicted. However, the categories that they will be entered in cannot be determined until the day before the science fair. All schools are asked to phone the office of the Helping Teacher as soon as it is known who will be representing their school and to indicate what the category of each project will be. This ensures that adequate space will be available for all the projects in each category.

In summary, the district science fair is held on a Friday evening in the middle of March. Schools send representatives to the science fair based on the number of intermediate classes in the school. Students from grades four to seven only are eligible to enter the district science fair. The judges are requested from a variety of school and community sources. The district science fair is coordinated by the Curriculum Helping Teacher (Science) who is assisted by a committee of interested teachers. All participants in the science fair receive ribbons and certificates while the winners receive additional ribbons and a book.

Please ignore shaded areas.

BACKGROUND INFORMATION

The purpose of this section is to determine the teacher experience and school setting upon which the answers to the questionnaire are based.

1. How many years have you taught as of June 1985?

   0 years (beginning teacher) . . . . . [ ] 1
   1 - 5 years . . . . . [ ] 2
   6 - 10 years . . . . . [ ] 3
   10+ years . . . . . [ ] 4

2. Are you male or female?

   Male . . . . . [ ] 1
   Female . . . . . [ ] 2

3. What was the last level of science course that you successfully completed? (Check one)

   Grade 10[1] 11[2] 12[3] University 1 yr[4] 2nd[5] 3rd[6] 4th[7]

4. How often do you read science magazines and/or books? (Check one)

   Weekly[1] Monthly[2] 3-6 times/year[3] Never[4]

5. How often do you watch science programs on T.V. such as Nova, Nature of Things, nature programs etc.? (Check one)

   Weekly[1] Monthly[2] 3-6 times/year[3] Never[4]

6. Did any pupils from your class participate in your school's Science Fair this year? (1985/86)

   Yes . . . . . [ ] 1
   No . . . . . [ ] 2

TEACHER INSERVICE RELATED TO SCIENCE FAIRS

The purpose of this section is to gather information about Science Fair inservice activities that have been presented in the past and whether there is a need for future inservice activities.

7. Have you attended any inservice activities relating to Science Fairs? [Check all that apply]

NO . . . . . [ ] 7

YES A. What kind of inservice activity?

a] Afterschool workshop . . . . . [ ] 8
b] Professional day workshop . . . . . [ ] 9
c] Workshop at a conference . . . . . [ ] 10
d] Other [specify] . . . . . [ ] 11

_____

_____

B. Please specify topics about Science Fairs that you found useful.

_____

_____

_____

8. Would you attend any inservice activities relating to Science Fairs if they were offered? [Check all that apply]

NO . . . . . [ ] 12

YES A. What kind of inservice activity would you attend?

a] Afterschool workshop . . . . . [ ] 13
b] Professional day workshop . . . . . [ ] 14
c] Workshop at a conference . . . . . [ ] 15
d] Other [specify] . . . . . [ ] 16

_____

_____

B. Please specify topics about Science Fairs that you would like presented.

_____

_____

_____

SCIENCE INSTRUCTION: TIME ALLOTMENTS

The purpose of this section is to determine the grades to which you teach science and the amount of time you teach science.

9. Are you teaching Science to an intermediate class [grades 4-7] this year [1985-86]?

YES [Please continue to next page] . . . . . [ ] 1 17
NO [Thank you for your time, please turn to the last page] . . [ ] 2

If you are teaching Science to more than one grade choose the grade with which you are most familiar. In case of a split class, choose the grade with the highest enrollment.

10. Which one of the following best describes the grade you teach.

Grade 4	[ ]1	18
Grade 5	[ ]2	
Grade 6	[ ]3	
Grade 7	[ ]4	
Special Intermediate Class	[ ]5	

11. For how many minutes during each week, on the average, did you teach Science for

a) the time period September to December 1985? [Check one]

0[1] 30[2] 60[3] 90[4] 120[5] 150[6] 180[7] 180+[8] 19

b) the time period January to March 1986? [Check one]

0[1] 30[2] 60[3] 90[4] 120[5] 150[6] 180[7] 180+[8] 20

12. Was your class given <u>extra</u> in-class time to assist pupils in the preparation of their Science Fair project during the months of January, February and March, 1986?

NO . . . . . [ ]1 21

YES A. How many minutes per week of extra in-class time did your pupils receive. [For each month - check one]

a) January 15[ ]2 30[ ]3 60[ ]4 120[ ]5 120+[ ]6 22

b) February 15[ ]2 30[ ]3 60[ ]4 120[ ]5 120+[ ]6 23

c) March 15[ ]2 30[ ]3 60[ ]4 120[ ]5 120+[ ]6 24

13. Did you assist any pupils with their Science Fair projects during out of school time? [ie. before school, noon hour, after school].

NO . . . . . [ ]1 25

YES A. Please estimate the total number of minutes per week which you assisted pupils with their projects during out of school hours. [For each month - check one]

a) January 15[ ]2 30[ ]3 60[ ]4 120[ ]5 120+[ ]6 26

b) February 15[ ]2 30[ ]3 60[ ]4 120[ ]5 120+[ ]6 27

c) March 15[ ]2 30[ ]3 60[ ]4 120[ ]5 120+[ ]6 28

B. Please estimate the number of pupils which you assisted during out of school time. _____ pupils 29/30

SCIENCE INSTRUCTION: TEACHING ACTIVITIES

The purpose of this section is to determine:

- what kinds of instructional activities you use for your science instruction;
- the extent to which these activities are modified during the 2½ month period prior to the Science Fair.

• Please answer questions 14 & 15 for the time periods September to December 1985 and January to March 1986 separately.

14. For what % of time do you use each of the following teaching materials?

1	2	3	4
never [0%]	occasionally [1-33%]	frequently [34-66%]	mostly [67-100%]

Teaching Materials	1985 Sept. - Dec.		1986 Jan. - March	
Exploring Science textbook	1 2 3 4	31	1 2 3 4	32
S.T.E.M./Focus on Science textbooks	1 2 3 4	33	1 2 3 4	34
B.C.T.F. Lesson Aids	1 2 3 4	35	1 2 3 4	36
Teacher designed units [your own]	1 2 3 4	37	1 2 3 4	38
Materials Based Unit [prescribed kits]	1 2 3 4	39	1 2 3 4	40
Which kits?	_____		_____	
	_____		_____	
	_____		_____	
Supplementary materials from C.M.C. [pamphlets, Teacher Guides etc.]	1 2 3 4	41	1 2 3 4	42
Which ones?	_____		_____	
	_____		_____	
	_____		_____	

15. How often did you involve your pupils in the following activities/approaches in your science classes? (Circle one)

1	2	3	4	5
never	once or twice in 3/4 months	once or twice a month	once or twice a week	almost every class

Activities/Approaches	1985 Sept. - Dec.						1986 Jan. - March					
a] Carrying out experiments from a set of instructions	1	2	3	4	5	43	1	2	3	4	5	44
b] Making up their own experiments	1	2	3	4	5	45	1	2	3	4	5	46
c] Listening to teacher's explanations	1	2	3	4	5	47	1	2	3	4	5	48
d] Interacting with the teacher in a mix of questions/explanations	1	2	3	4	5	49	1	2	3	4	5	50
e] Classifying objects/events	1	2	3	4	5	51	1	2	3	4	5	52
f] Answering questions from work-sheets/ textbooks	1	2	3	4	5	53	1	2	3	4	5	54
g] Copying notes from blackboard/ overhead projector/charts etc.	1	2	3	4	5	55	1	2	3	4	5	56
h] Watching audio visual presentations	1	2	3	4	5	57	1	2	3	4	5	58
i] Memorizing	1	2	3	4	5	59	1	2	3	4	5	60
j] Preparing for experimental investigations to be carried out at home	1	2	3	4	5	61	1	2	3	4	5	62
k] Reading from textbooks	1	2	3	4	5	63	1	2	3	4	5	64
l] Doing library research	1	2	3	4	5	65	1	2	3	4	5	66
m]Listening to guest lectures/ presentations	1	2	3	4	5	67	1	2	3	4	5	68
n] Going on fieldtrips	1	2	3	4	5	69	1	2	3	4	5	70
o] Using computer assisted instruction	1	2	3	4	5	71	1	2	3	4	5	72

16. Throughout the 1985/1986 school year, what provisions were made for individual differences among students in your science class? [Check all that apply]

a]	No special provisions	[ ]	73
b]	Individualized programs	[ ]	74
c]	Achievement grouping within the class	[ ]	75
d]	Special interest groups	[ ]	76
e]	Other [specify]	[ ]	77

_____

_____

17. Does student participation in Science Fairs provide for the individual differences of your pupils?

NO	[ ] 1	78
YES	[ ] 2	

18. How many pupils are there in your class? In the case of a split class indicate the total number of pupils ___ pupils 79/80

19. How many pupils from your class completed a Science Fair project? [If 2 pupils worked together on one project count them both] ___ pupils 81/82

20. In my class:

	Yes	No	
a] All pupils are encouraged to complete a Science Fair project	[ ] 1	[ ] 2	83
b] All pupils are required to complete a Science Fair project	[ ] 1	[ ] 2	84

21. Did you provide activities and/or resources to assist your pupils in doing a Science Fair project?

NO [ ] 85

YES Please check those activities and/or information which you provided. [Check all that apply]

a]	Pupil Information Booklet	[ ]	86
b]	Teacher Information Booklet	[ ]	87
c]	Slides of previous Science Fair projects from C.M.C.	[ ]	88
d]	Slides of your own showing Science Fair projects	[ ]	89
e]	Filmstrips of how to do/display a Science Fair project	[ ]	90
f]	Presentation from Helping Teacher	[ ]	91
g]	Discussion	[ ]	92
h]	Wall display showing how to do a project	[ ]	93
i]	Wall chart of pupil progress	[ ]	94/95
j]	Presentation by other person	[ ]	96/97

Specify _____

_____

k]	Other	[ ]	98/99

Specify _____

_____

22. Which of the following activities and/or resources would you use to help your pupils prepare for a Science Fair if they were available? [Check all that apply]

a]	Video tape of how to carry out a project	[ ]	100
b]	Video tape of pupil presentation	[ ]	101
c]	Exhibits from previous Science Fairs	[ ]	102
d]	None	[ ]	103
e[	Other	[ ]	104

Specify _____

_____

23. Are the Science Fair project evaluations used for reporting pupil progress in Science?

NO . . . . . [ ] 105

YES A. What percentage of the report card mark did the Science Fair project evaluation contribute for the reporting period January - March 1986? [Check one]

10%	20%	30%	40%	50%	60%	70%	80%-100%
[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]

B. Who evaluated the Science Fair project for the report card mark? [Check all that apply]

a]	Pupil's self evaluation	[ ]	106
b]	Teacher only	[ ]	107
c]	Judge only	[ ]	108
d]	Both teacher & judge	[ ]	109
e]	Other	[ ]	110

Specify _____

_____

C. Which of the following were used to evaluate the Science Fair project for the report card mark? [Check all that apply]

a]	The display	[ ]	111
b]	The pupil presentation to class	[ ]	112
c]	The pupil presentation to teacher (individually).	[ ]	113
d]	The pupil presentation to judge	[ ]	114
e]	The completion of project	[ ]	115
f]	The criteria for judging as per District guidelines	[ ]	116
g]	Each step in the process of completing a Science Fair project . .	[ ]	117
h]	Other	[ ]	118

Specify _____

_____

TEACHER ASSESSEMENT OF SCIENCE FAIRS

24. For Questions 1 - 11, please check the appropriate response. If you:

[1] agree very much [2] agree somewhat [3] agree very little [4] disagree

1.	Science fairs stimulate the students to work beyond what is covered in class.	1	2	3	4	119
2.	Science fairs help students develop poise and self confidence.	1	2	3	4	120
3.	Science fairs provide students with a chance to gain practice in research.	1	2	3	4	121
4.	Science fairs allow the students to work independently.	1	2	3	4	122
5.	Science fairs teach students to be thorough.	1	2	3	4	123
6.	Science fairs promote an understanding of the scientific method.	1	2	3	4	124
7.	Science fairs help students meet other students with like interests.	1	2	3	4	125
8.	Science fairs introduce students to adults with like interests and knowledge in science.	1	2	3	4	126
9.	Science fairs are useful in focusing the role of science in education.	1	2	3	4	127
10.	Science fairs provide the students with earned recognition.	1	2	3	4	128
11.	Science fairs allow the students to work cooperatively	1	2	3	4	129

GENERAL COMMENTS

Return to: Burt Deeter
Curriculum Helping Teacher
[Science]
Courier #72

Please return by May 30, 1986

Please ignore shaded areas.

SCHOOL SCIENCE FAIR INFORMATION

The purpose of this section is to gather information about the nature of your school's Science Fair.

1. How were pupils selected to represent your school at the District Science Fair?

   a) They were selected as winner from the school Science Fair . . . . . [ ] 1
   b) They were selected from one or more individual classroom Science Fairs . . . . . [ ] 2
   c) No pupils from my school were at the District Science Fair [ ] 3
   d) Other . . . . . [ ] 4
   Specify _____

   _____

2. Which of the following best characterizes the viewing of your school's Science Fair projects? [Check all that apply]

   A. The public are encouraged to view the projects during

      a) The day only . . . . . [ ] 1
      b) The evening only . . . . . [ ] 2
      c) Both day and evening . . . . . [ ] 3
      d) Other . . . . . [ ] 4
      Specify _____

      _____

   B. All projects are viewed in one or two large areas (gym, library etc.) . . [ ] 5

   C. Projects are viewed only in the classrooms . . . . . [ ] 6

   D. Projects are viewed in classrooms with the best from each class viewed in one large area (gym, library etc.) . . . . . [ ] 7

3. Pupils from which grades participate in the School Science Fair? [Check all that apply]

   a) Pupils from grades K-7 in one Science Fair . . . . . [ ] 1
   b) Pupils from grades K-3 and 4-7 (two separate Science Fairs) . . [ ] 2
   c) Pupils from grades 4-7 only . . . . . [ ] 3
   d) Other . . . . . [ ] 4
   Specify _____

   _____

4. Pupils from which grades are required to participate? [Check one]

   a) All pupils K-7 are required to participate . . . . . [ ] 1
   b) All pupils 4-7 are required to participate . . . . . [ ] 2
   c) Only pupils from some classes are required to participate . . . . [ ] 3
   d) Pupils participate only if they are interested . . . . . [ ] 4
   e) Other . . . . . [ ] 5
   Specify _____

   _____

1
2
3
4
5
6
7

5. How many classes participated in the school Science Fair? ___ 8,9

6. How are projects selected for the School Science Fair?

A. Every project is entered in the School Science Fair . . . . . [ ] 1
B. Only the best projects from each class are selected for the School Science Fair . . . . . [ ] 2 10

1) The best projects are selected by: (Check all that apply)

a) Teachers . . . . . [ ] 1
b) Peers . . . . . [ ] 2
c) Secondary students . . . . . [ ] 3
d) Parents . . . . . [ ] 4
e) Community members . . . . . [ ] 5
f) School District officials . . . . . [ ] 6
g) University students . . . . . [ ] 7
h) Other . . . . . [ ] 8 11
Specify _____

_____

7. Who selects projects to represent the school at the District Science Fair? (Check all that apply)

a) Teachers . . . . . [ ] 1
b) Peers . . . . . [ ] 2
c) Secondary students . . . . . [ ] 3
d) University students . . . . . [ ] 4
e) Parents . . . . . [ ] 5
f) Community members . . . . . [ ] 6
g) School District officials . . . . . [ ] 7
h) Other . . . . . [ ] 8 12
Specify _____

_____

8. Who receives awards at the school Science Fair? (Check all that apply)

a) All pupils receive participation ribbons/certificates/buttons, etc. . . . . [ ] 1
b) Pupils in each grade receive First, Second, Third, Outstanding/Excellence awards . . . . . [ ] 2
c) Pupils in each category receive First, Second, Third, Outstanding/Excellence awards . . . . . [ ] 3
d) Only pupils selected to represent the school at the District Science Fair receive First, Second, Third, Outstanding/Excellence awards . . . . . [ ] 4 13

9. How many regular classes K-7 are in your school?

1-4 classes . . . . . [ ] 1
5-8 classes . . . . . [ ] 2
9+ classes . . . . . [ ] 3 14

PRINCIPAL ASSESSMENT OF SCIENCE FAIRS

10. For Questions 1 - 11, please check the appropriate response. If you:

[1] agree very much [2] agree somewhat [3] agree very little [4] disagree

1.	Science fairs stimulate the students to work beyond what is covered in class.	1	2	3	4
2.	Science fairs help students develop poise and self confidence.	1	2	3	4
3.	Science fairs provide students with a chance to gain practice in research.	1	2	3	4
4.	Science fairs allow the students to work independently.	1	2	3	4
5.	Science fairs teach students to be thorough.	1	2	3	4
6.	Science fairs promote an understanding of the scientific method.	1	2	3	4
7.	Science fairs help students meet other students with like interests.	1	2	3	4
8.	Science fairs introduce students to adults with like interests and knowledge in science.	1	2	3	4
9.	Science fairs are useful in focusing the role of science in education.	1	2	3	4
10.	Science fairs provide the students with earned recognition.	1	2	3	4
11.	Science fairs allow the students to work cooperatively	1	2	3	4

15 16 17 18 19 20 21 22 23 24 25

GENERAL COMMENTS

Please feel free to add any comments or suggestions concerning the District Science Fair that you may have. You may wish to comment on the materials/ information, structure, organization or Science Fairs in general.

THANK YOU FOR YOUR TIME

GENERAL COMMENTS

Return to: Burt Deeter
Curriculum Helping Teacher
[Science]
Courier #72

Please return by May 30, 1986

MEMORANDUM

TO:

FROM: Burt Deeter
Curriculum Helping Teacher [Science]

RE: Science Fair Survey

****

Just a quick reminder to please complete the survey and forward it to me as soon as possible. I know that you are very busy but it will be easier for us to improve Science Fair if we receive your completed questionaire.

Thank you once again for your time.

P.S. If you have returned your questionaire without your name tag, please check the box and return this memo so you will not receive any more reminders. ☐

Publications: Titles

1) AUTHORED

- Planning Science Fairs
- Comet Activities
- S.A.S.A. (Seagull Assisted Survival Activities)
- Are You Game?
- Science Challenges
- Care of Plants and Animals in the Classroom
- Sci-Ventures Newsletter
- Enrich Newsletter
- The Great Escape
- Spiders in the Classroom

2) CO-AUTHORED

- Rotten Luck
- An Array of Astronomical ACtivities
- Activities with Plastic Bags
- Lunar-Tiking
- It's About Time

3) EDITED

- Science Fair Pupil Booklet, 1981 - 1986
- Science Fair Teacher Booklet, 1981 - 1986
- Salmon in Your Classroom (2)
- Green Timbers Forest Sciences Activities, 1981 - 1986
- Hatching Chicks
- Plant Growth and Behaviour
- Pets and People
- Sciencing
- Read Aloud Books in Environmental Education