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The effects of parental involvement in the science learning of students in a Saturday Science Academy

John Martin Whitmon
Clark Atlanta University

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ABSTRACT

EDUCATION

WHITMON, JOHN

B.S., LINCOLN UNIVERSITY, 1991

THE EFFECTS OF PARENTAL INVOLVEMENT ON THE SCIENCE LEARNING OF STUDENTS IN A SATURDAY SCIENCE ACADEMY

Advisor: Dr. Bonita E. Alick

Thesis dated June, 1994

The purpose of this study was to assess the relationship of parental involvement in a student's education, as it relates to success in science learning. Success was measured in terms of student motivation, participation, and perception of science. Through an ethnographical designed study, observations were made of participants in a Saturday Science Academy. The research served to address several research hypotheses. The results generated from this study showed that positive reinforcement from a parent generates greater appreciation and understanding of science among children. In addition, it was revealed that effective enrichment programs which provide hands-on learning, promotes a greater perception of and increases enthusiasm in science learning.
THE EFFECTS OF PARENTAL INVOLVEMENT IN THE SCIENCE LEARNING OF STUDENTS IN A SATURDAY SCIENCE ACADEMY

A THESIS
SUBMITTED TO THE FACULTY OF CLARK ATLANTA UNIVERSITY
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR
THE DEGREE OF MASTER OF ARTS

BY
JOHN MARTIN WHITMON

SCHOOL OF EDUCATION

ATLANTA, GEORGIA
JUNE 1994
ACKNOWLEDGMENTS

There are many to whom the writer is deeply indebted for assisting in the writing of this paper. However, there are four special people that shall be acknowledged.

The writer wishes to express sincere appreciation and gratitude to Dr. Bonita Alick, for her time and effort in guiding this study.

A special thanks is given to the writer’s devoted parents, Mr. and Mrs. Chester and Yvonne Whitmon, for providing a seed of love and support and watching it grow.

In addition, sincere appreciation is extended to Ms. Jennifer Crock for the re-typing and editing of this study. She has been a major force in the completion of this study.
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CHAPTER I
THE RATIONALE

It is evident that the student is at the center of all learning. Efforts must be made to help students master what is being taught. With increasing school enrollment throughout the country, and classroom overcrowding, the problem of mastering subject matter surfaces. Thus, alternatives must be considered to gain and master full understanding of subject principles, concepts and processes in various subject areas.

Numerous research studies have been conducted concerning educational alternatives, as they relate to complete subject mastery. Studies have shown an effective alternative is heightened parental involvement in their children's education. In addition, school effectiveness studies have shown parental involvement to be an essential component of an "effective" school.¹

In research conducted by Joyce Epstein, it was concluded that elementary school children, whose teacher emphasized parental involvement, gained more in reading and math achievement as opposed to those children who do

and math achievement as opposed to those children who do not have parental involvement. It was also observed, that students have more positive attitudes and greater work habits, when teachers stress parental involvement.2

According to educational researcher, Rebecca Crawford, parental involvement is one of the keys to success in school for children of all ages and types. In other words, parental involvement results in improved student achievement, attendance, motivation, self-esteem, and behavior.3

Her investigations have continued to demonstrate that when parents are involved in the education of their children, teachers gain an understanding of families cultures, needs, goals and capabilities. Teachers also learn that parents can offer valuable resources, skills, talents and creativity that can enrich teaching and learning. Through parent involvement programs, teachers are able to share the responsibility of educating children with parents who can provide volunteer time, home help and positive influences on their children.4

Researchers report that, "Now as perhaps never before, the need is being felt nationwide to strengthen the bond of

2Joyce L. Epstein, Parent Involvement: Implications of limited English-proficient parents


4Ibid, 10.
cooperation between home and school." Researchers contend that, "Schools face the challenge of preparing an increasingly diverse generation of young people for a society in which literacy is a must, understanding of technology and its many applications is required, and the ability to solve problems and find answers to questions not yet posed is essential." They further point out that "Families, for their part, must prepare their children for a future in which they can expect to move and change jobs or careers many times." Therefore, parental involvement serves as a viable alternative to increased subject achievement among students.

In an effort to address the issues of achievement in the subject area of science, Robert Pool provided a science review on "Who will do Science in the 1990's". The review examined simulated predictions of economist Robert Dauffenbach of Oklahoma State University. Dauffenbach forecasts the U.S. labor supply for the National Science Foundation.

He predicts that there will be only 10,000 new jobs for biological scientists over the next decade, a growth rate of only 15%, an increase that is no greater than

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the work force as a whole.\textsuperscript{6}

His predictions are aligned with other economic forecasters in that there will be a sharply increasing demand for scientists and engineers, at a growth rate approximately two times faster than the rest of the economy.

In the aforementioned study, a combination of statistical predictions and research findings, have clearly defined the reason why science achievement is necessary among all school age students, regardless of race and gender. But, the same statistical data clearly indicates the disparities among minority and female groups in the area of science. The research data revealed that from 1979 to 1988, the total number of blacks becoming Ph.D. scientists and engineers dropped 20%; they now earn only 1% of all doctoral degrees in the natural sciences and engineering, despite making up 11% of the working-age population.\textsuperscript{7}

It is evident that the difficulties do not begin in college or graduate school, but much earlier. The 1988 Scholastic Aptitude Test scores of African American students were 200 points less than Whites and Asians.\textsuperscript{8} In 1990, the average science proficiency for fourth, eight and twelfth


\textsuperscript{7}Ibid, 435.

\textsuperscript{8}Ibid.
graders was assessed. The results revealed that there were gaps between White and African American students, with a difference of 37, 42, and 46 scale points in grades 4, 8, and 12, respectively. In addition, parental involvement is viewed as a viable alternative to subject achievement, and therefore may influence students' achievement in science. This study attempted to determine if parental involvement influences minority students' science interest, involvement and achievement in science.

Statement of the Problem

With increasing demands, conflicts and constraints introduced into the academic setting, one must establish different alternatives to achieving in science. After examining studies of parental involvement and statistical predictions, as they relate to minorities, as well as, assessing minority science enrichment programs, the researcher found that it was desirable to examine the possible influences of parental involvement on the motivation, participation and perception of students in the subject area of science.

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The Purpose of the Study

The purpose of this exploratory study was to investigate the possible relationship between parent and student interaction in science learning. More specifically, this study attempts to examine the influence parental involvement may have on students' motivation, participation and perception of science. The findings of this study may be useful in providing insight into effective and non-effective strategies used by parents to generate motivation, participation and perception of science among students.

Statement of Hypotheses

This study addresses the relationship between parental involvement and students' motivation, participation in and attitudes toward science.

The possible relationships may be identified by the examination of several hypotheses.

1.) Parental attitude and comprehension of science issues have a direct effect on their children's understanding of science.

2.) Parental involvement affects motivation and participation of students in science.

3.) Participation of students in intervention programs influence their attitudes toward science.
CHAPTER II

A REVIEW OF THE LITERATURE

Over the past two decades, great efforts have been made to reform education. Within the past decade, statistics have revealed that the national educational system is lagging behind other industrialized nations at an alarming rate in educational achievement, resulting in a massive impending shortage of American scientists, mathematicians, and engineers. These same studies revealed that minority and female groups lag depressingly further behind at the national level.

Walter E. Massey, director of the National Science Foundation, argues, "America should be concerned about our educational system, not because some other country beats U.S. sixth graders on a math test, but because we have a raft of evidence that we are failing to provide many of our children with the tools needed for lifelong learning."  

He also predicts, that "By the year 2000, minority students will account for 40 percent of our elementary and

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secondary school population. Yet, only four percent of our undergraduate science and engineering degrees are awarded to minorities."

However, there is also evidence that not all minority and female groups are underachieving. With studies and proposed plans for educational reform, greater parental involvement has been cited as a viable alternative. A review of related literature resulted in dividing the subject into three areas:

1.) Parental Involvement in Schools.
2.) Minority Enrichment Programs in Science.
3.) Parental Involvement in Minority Enrichment Programs.

There is a wealth of research documents that illustrate multiple benefits born out of active parental involvement. Comer denotes that emotional support is essential to a child’s learning. He indicates that emotional support is optimally created through family and school cooperation. While studies of Rich revealed that, improved attendance and behavior are generated through strong parent-teacher relations.

Research has shown that experts fall on two sides, in

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12Ibid.


relation to parent and school involvement. The Committee for Economic Development argues that programs should be developed to "teach parents how to provide a home environment that encourages learning." While others place greater stress on the school, arguing that just as parents can be helped in their parenting functions, teachers can also become more effective by learning partly from the parents' teaching. This shared exchange would then generate a more harmonious instructional style.\(^\text{15}\)

Other investigations of teacher's attitudes toward to parent roles in school, and parent attitudes toward teachers and school functions, have led to strong summary points:

- teachers have predetermined suppositions that there is a distinct number of parents who show no interest in their children's schooling and educational progress and that this is established in their minds linked to home factors.

- There is no evidence of this being true; an apparent lack of interest is probably indicative of other factors that are associated with domestic privation and stress. There is no conclusive evidence to show that working class parents are intrinsically less concerned, than their middle class counterparts, about

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their children educational achievement.\textsuperscript{16}

All of the reviewed literature, on parental involvement in schools, revealed that when families and schools collaborate closely, students are the ultimate beneficiaries. The literature also revealed reasons why parents and school often do not cooperate.

There is an overall feeling of inadequacy that defers parental involvement, according to Kristy Sasser, \textit{Parent Involved in School: Reluctant Participation (Do not =) Uninterested Parents}. "Upon initial contact with the school, many parents are so overwhelmed with the elitism they encounter that they do not contact the school unless the school contacts them."\textsuperscript{17}

The same research argues that there is a negative insinuation related to school communication, with the traditional reputation being that parents, like students are "called to the office" only when there is or has been a problem.

This research also makes the claim that, while wanting to invoke parent-school alliances, educators are only

\begin{quote}

\textsuperscript{17}Kristy Sasser, \textit{Parent Involved in School: Reluctant Participants (Do Not =) Uninterested Parents}, 5.
\end{quote}
willing to assign mere passive roles to them. Through research performed by Joyce Epstein, a principal researcher in the area of parental involvement and its effects on student achievement, the researcher identified five categories for parental involvement in their students educational achievement:

1. **Providing for children's basic needs**
   
   By ensuring that children are fed, clothed, have enough sleep, and enjoy a secure, loving environment, parents contribute to the well-being that a child needs to focus attention on learning both at home and at school. One school-related example is ensuring that children have necessary school supplies and a place to study at home.

2. **Communicating with school staff**

   During an academic year, a school must be able to communicate with the parent at any given time. There are a variety of factors that can inhibit communication, including the literacy level and proficiency in the official language (usually English). When schools are able to provide written communications, whereby the parent can understand and the family has a person who can communicate with the

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18 Violard-Sanchez, *Fostering Home-School Cooperation*, 5-6.
school, cooperation between schools and language minority parents is greatly facilitated.

3. Volunteering or providing assistance at their child's school.

4. Supporting and participating in learning activities with the child at home.

5. Participating in governance and advocacy activities.

Minority Enrichment Programs in Science

In 1984, the Committee for Economic Development reported that 36 percent of the babies born in this country were minorities and by the year 2000, the proportion of minority children under the age of 18 will be at least 38 percent. Continuous efforts must be made to enhance comprehension and experience in science for minority and female groups. A review of the literature, on minority enrichment programs in the sciences, revealed a pool of such programs. The programs were categorized as school based, school linked or organization related.

At the University of California, Berkley, a program, SCIENCE EQUALS SUCCESS was devised. The program served to improve the teaching and learning of math through hands-on problem solving approaches and the teaching and learning of science through the discovery approach. The program

incorporated problem solving approaches because previous research revealed that females lagged behind males at substantial rates in multi-step problem solving. The program also used cooperative learning approaches to support prior research which contended that minorities and females seem to work better as pairs or in groups in solving common problems. Finally, in an attempt to extend research on perception and problems associated with objects and figures, spatial skills were incorporated into the program.²⁰

Kids Investigating and Discovering Science (KIDS), a school linked science enrichment program, which seeks to improve science and mathematic instruction for minority students, was another example of minority enrichment programs that work. The program possessed the same basic traits as hundreds of similar programs. Hands-on relative learning coupled with concepts to cultivate higher order thinking has been the success of this University of California, Irvine linked program. Eloy Rodriguez, the founder of the four week summer science program, for Hispanic kindergarten through six graders, contends that "All students have the capacity to learn science"; whether or not there is a language deficiency.²¹


The "SAY YES" program, an organization related program, piloted by the National Urban Coalition, is an activities based early intervention program. The program targets family learning in math and science for minority students in grades K through 6 and their parents.22

While there are many different programs, designed to enhance the knowledge and appreciation of science among minority students, all of them possessed common features of demanding hard work and academic excellence. In addition, they are accented by well trained teachers who are enthusiastic about empowering students with knowledge in science.

As the literature on minority and gender levels in science was reviewed, drenching facts were manifested.

Although African American children continue to express interest in science, schools do not encourage African Americans and females to take courses synonymous with scientific, mathematic and engineering careers.23

A study entitled Girls and Women in Science and Technology Education introduced an interesting perspective.

In an increasingly technological dependent world, where


problems and solutions tend to be defined in technological
terms, more efforts must be made to change a one gender
dominated technological profession. This study by Ingrid
Granstan, provided several recommendations for introducing
females to science and technology:24

1.) spare time activities and theme courses in
technology.
2.) introduction of practical technology for small
girls.
3.) very early introduction.
4.) personal legitimatization from other women and
minorities.

24Ingrid Granstan, Girls & Women in Science & Technology
Education (Baltimore, Maryland: ERIC Document Reproduction
CHAPTER III

METHODOLOGY

This exploratory study was ethnographic in nature, which functions to recreate for the reader shared beliefs, practices, knowledge, and behavior of a specific group of individuals.

Ethnographic studies are not widely used in educational research because it focuses on the quality of "intact cultural scenes and groups" as opposed to the quantity of those scenes or groups. This study employed ethnographic research by focusing on human life, a single research setting and the creation of investigative strategies. A table detailing the events of the research is provided.

(see table 1)
# TABLE 1

## TABLE OF KEY EVENTS

<table>
<thead>
<tr>
<th>SESSION</th>
<th>DESCRIPTION OF KEY EVENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Session 1</td>
<td>Introduction of the program; Discussion of program's magnitude and nature addressed to parents by the SSA founder.</td>
</tr>
<tr>
<td>Session 2</td>
<td>First full day of classes for the SSA Spring 1993 session.</td>
</tr>
<tr>
<td>Session 3</td>
<td>Consent forms were sent home for approval of research.</td>
</tr>
<tr>
<td>Session 4</td>
<td>Observations of student participation level conducted in science laboratory for 6, 7, &amp; 8 grade students.</td>
</tr>
<tr>
<td>Session 5</td>
<td>Observations of student participation level conducted in science laboratory for 3, 4, &amp; 5 grade students.</td>
</tr>
<tr>
<td>Session 6, 7, &amp; 8</td>
<td>Random student interviews conducted.</td>
</tr>
<tr>
<td>Session 9</td>
<td>Canceled (snowstorm).</td>
</tr>
<tr>
<td>Session 10</td>
<td>Presentation of certificates &amp; production of SSA Science Scrap Book.</td>
</tr>
</tbody>
</table>
The research period commenced January 16, 1993 and ended March 20, 1993. Methods and details of the study are listed below.

Selection and Sampling

The selected site for the research study was Atlanta, Georgia. Atlanta is the largest city in the Southeast and is the tenth largest city in the United States. This site was chosen because of its accessibility to the researcher and the involvement in a joint research effort between two universities.

A collaborative project was devised between faculties at a historically Black University, and a large land grant University in Ohio. The latter, houses the National Center for Science Teaching and Learning. The major focus of the project was the Saturday Science Academy.

A principal component of the research agenda, at the National Center on Science Teaching and Learning, has been to examine the social forces that have an impact on the delivery of science instruction in the United States.

The setting for the study was the Saturday Science Academy (SSA) of the Atlanta Comprehensive Regional Center for Minorities (ACRCM) at Clark Atlanta University. The study was conducted during the Spring 1993 session of the Saturday Science Academy. The SSA is an academic enrichment program for elementary and middle school students in grades three through eight. The SSA meets continuously during a ten week
session, from 9:00 a.m. to 12:00 p.m. The philosophy of the academy is that every child can learn science. Thus, it provides motivational and explorational experiences in the area of laboratory science, mathematics, creative expressions and computer science, different from the traditional school environment. In addition, the Academy has been designed to foster positive role models and to encourage African American youths to embark upon science related careers.

Sample Selection

The population in this study consisted of those students enrolled in the Spring, 1993 session of the SSA. There were 186 students enrolled.

At the beginning of the study, consent forms were given to each participant. The students who were willing to participate in the study, by obtaining permission through the signed and returned consent forms, served as the population from which the sample was selected. Seventy six students returned their signed consent forms. A random stratified sample was drawn from the program participants to include students from each grade level.

Parents were selected on the basis of their verbal agreement to participate in the research.

Each student participant was given a correspondent code of CP, which indicated a Current Participant in the Academy. This was done for identification purposes during the
Each parent participant was given a correspondent code, as well, to create complete anonymity. The code PI was given, to refer to the Parent Interview.

TABLE 3
CORRESPONDENT CODES OF PARENT INTERVIEWS

<table>
<thead>
<tr>
<th>PI#</th>
<th>Sex</th>
<th>Sex</th>
</tr>
</thead>
<tbody>
<tr>
<td>PI1</td>
<td>Male</td>
<td>PI6</td>
</tr>
<tr>
<td>PI2</td>
<td>Female</td>
<td>PI7</td>
</tr>
<tr>
<td>PI3</td>
<td>Female</td>
<td>PI8</td>
</tr>
<tr>
<td>PI4</td>
<td>Female</td>
<td>PI9</td>
</tr>
<tr>
<td>PI5</td>
<td>Male</td>
<td>PI10</td>
</tr>
</tbody>
</table>

Research Team

The research team consisted of the principal investigator, who was responsible for conducting all phases of the research.

Instrumentation

The instruments utilized for this study were the SSA Current Student Participant Questionnaire (CSPQ) (see Appendix A) and the SSA Parent Questionnaire (PQ) (see Appendix B). The CSPQ and PQ were designed by the researcher for this
Content validity was drawn through a panel of three educational professors who tested the validity of the designed instrument. There was a consensus that each question was appropriate for the variables to be addressed in the study. The CSPQ and PQ were designed to serve as lead questions that offered the principal investigator a vehicle to ask probe questions in a guided design interview session. This was done in an effort to determine if a relationship existed among parental involvement and student motivation, participation in, and attitudes towards science. Analysis of the research hypotheses were achieved through comparisons of responses, from the two questionnaires. Table 4 illustrates how comparisons were made between the two research specific instruments, as they relate to the specific categories.
TABLE 4

TABLE OF INSTRUMENT COMPARISONS

<table>
<thead>
<tr>
<th>Category 1</th>
<th>Self Concept of Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSPO question #s</td>
<td>PQ question #s</td>
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<td>6</td>
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<table>
<thead>
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<th>Category 2</th>
<th>Science Interest</th>
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<tr>
<td>CSPO question #s</td>
<td>PQ question #s</td>
</tr>
<tr>
<td>2</td>
<td>*</td>
</tr>
<tr>
<td>3</td>
<td>2 &amp; 3</td>
</tr>
<tr>
<td>7</td>
<td>4 &amp; 7</td>
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</table>

<table>
<thead>
<tr>
<th>Category 3</th>
<th>Other Influences</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSPO question #s</td>
<td>PQ question #s</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
</tr>
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</table>

Note: Comparisons were made across rows.
* No comparisons were made.

DATA COLLECTION

There were three research periods, utilized in this study, the pre-research, research and post-research periods. These research periods are described below, along with the key events of each period.

Pre-Research Period

Human Subjects Contract

Human subjects contracts were not necessary because subjects were not receiving any treatment. The subjects were not exposed to any physical or mental harm due to participation in the study. The participants were given verbal guarantees by the principal investigator of anonymity.
and confidentiality.

**Event 1.** The researcher gained permission from the OSU-CAU collaborative research director to conduct the research.

**Event 2.** A letter accompanied by a consent form, (see Appendix C) that stated the nature of the collaborative research effort, was sent to every student enrolled in the SSA.

**Research Period**

**Event 3.** In-field observations were performed in the two science laboratories. The principal investigator made observations of the students motivation, participation and perception in each of the grade levels. The principal investigator took part in the students activities, giving an account of their interactions and activities in field notes, sometimes immediately or a short time thereafter.

**Event 4.** The principal investigator, during a given science period, would randomly ask a student if they had returned their signed consent form. If the student’s response was yes, and the principal investigator had their consent form on file, the student would then be interviewed. Each interview lasted approximately ten minutes.
Event 5. The student was taken to another location (empty science laboratory) and interviewed based upon the CSPQ with a recording device. The student would be cognizant of the recording device.

Event 6. When the student interviews were concluded, parental interviews were conducted. Here, the principal investigator conducted interviews based upon the PQ, at the leisure and convenience of the parent, at a designated location, on the CAU campus.

Event 7. With the aid of a key informant, more privileged knowledge was generated about parental involvement in students motivation, participation in and attitude toward science. In ethnographic research, the informant plays a variety of roles as desired by the researcher and informant. Such roles include introductions, alerting the researcher to unexplored data resources, and assisting in the development of theories grounded in the data. For this study, the informant provided introductions and insight into the format and atmosphere of the hierarchy of the Academy.

Event 8. These procedures were repeated until the SSA Spring 1993 session was over and/or until the principal investigator felt that a reasonable amount of data was collected.
Several techniques for collecting data for this study were employed; participant observation, structured and non-structured interviews and document collection.

**Post - Research Period**

**Procedure 9.** Analysis of the data throughout the collection of data.
CHAPTER IV

PRESENTATION OF FINDINGS AND ANALYSIS OF DATA

This chapter includes the major results and analysis of data collected for this study, as stipulated for ethnographic research. Several research techniques were employed to amass the data for this study. The data was categorized into three groups in an effort to address the research hypotheses. The categories were as follows:

1. Self Concept of Science and Science Careers
2. Science Interest
3. Other Influences

The results are presented according to the generated categories. Questions from the Current Student Participant Questionnaire and Parent Questionnaire, (CSPQ) & (PQ) respectively, were subdivided according to the categories.

The responses to the questions provided pertinent insight into the factors parents and students, alike, use to respond to motivation, participation and perception levels of science among students.

Whenever major themes or responses emerged from the data, key terms/phrases were generated to depict the overall theme or responses for that segment of the data.
Self Concept of Science and Science Careers

Generative questions, (those that are generated for the research) from the CSPQ and PQ were used to obtain the responses under this category. Those questions were as follows:

CSPQ
1. - What do you think studying science is all about?
6. - Do you think your parents have a good understanding of science?

PQ
1. - In your own words, what is your definition of science?
5. - How well do you understand the sciences?

When the current Saturday Science Academy participants were asked to define the study of science, a major theme that was generated was:

Science is a discipline that entails learning and studying the products of nature and understanding these products through experimentation.

Specific examples of responses were:

CP4 "You learn about the atmosphere and what's around you. Experiments and tests help you to do that."

CP8 "It's all about nature and how nature works. In science you learn how everything works. Tests show how everything operates in nature."

CP9 "Science is recording data and observations. And it's mixing chemicals from the earth."

When asked if the current SSA participants felt that their parents possessed sufficient understanding of science the following general response was given:

Yes, at least one parent has a sufficient understanding of science because one has an occupation that is science related.

Examples of specific responses were:
CP3 "Yes my dad does. My mom knows a little but I'm sure he knows more."

CP8 "Yes, both my parents understand science well. My dad is an engineer. He had to go through a special engineering school which dealt with science. And, my mom is a teacher of science."

CP7 "Yes very much! My dad does something in science, I can't remember. My mom is always talking about it. So, my mother and father understand science."

When parents of current SSA participants were asked to define the study of science, the following best assesses their most common responses:

Science is a non-traditional academic subject that requires intensive learning and extensive research. Science is a subject that deals with the universe and an understanding of it; that understanding comes through exploration and testing of many things.

Examples of specific responses were:

PI4 "The study of science means exploring unknown areas. Learning and following the scientific method of problem solving and included in that would be a study of mathematics as a branch of science."

PI6 "I think it (science) is exploring new technology and new ways of doing things: not only new, developing science and exploring technology."

PI10 "Science is learning and studying new ways of doing things. Science is study of the world and the things in it. Everything is science."

When the same parents were asked if they possessed an adequate knowledge of science the following best depicts their responses:

Yes, I possess an adequate knowledge of science for my child at his/her present level in science education. Parents displayed confidence in their ability to identify appropriate resources in science if the topics encountered by their children were beyond the scope of their knowledge.
Examples of specific responses were:

PI 4 "I think now I do, later I may not, but, we will know how to get help."

PI 5 "I think I have a general knowledge because of taking biology, chemistry, and physics light years ago. I feel I have a basic knowledge and would be able to channel her in the right way. I do rely on my father and uncle who have that background."

Science Interest

The generative questions that were used to amass the data for both student's and parent's interest in science were as follows:

CSPQ
2. - On a scale from one to ten, with ten being the highest and one being the lowest, rate your level of interest in science?
3. - Is science interesting or boring to you?
7. - Do you share the activities that you learn in the SSA with your parents?

PQ
2. - Is there any area of science that is of particular interest to you?
3. - As a child, did you like or dislike science?
4. - How often do you discuss science related topics with your child?
7. - Do you read science related literature and/or attend science oriented events?

The following, details the major theme given, when current SSA participants were asked to scale their interest in science.

A score from 8 to 10 indicates strong interest. Science is interesting because the physical activities associated with producing results provide a wealth of enjoyment.

Specific examples of responses were:

CP5 "I say 6, because I like science its fun, but I just don't like doing all those experiments and stuff, it makes me want to pull my hair out."
CP8 "I give it a 10 because it (science) teaches me about nature and it is just fun. Its fun when you do the experiments and they are about something you never learned."

CP12 "I would have to say 10. Science is very interesting because you learn by doing. You do tests and experiments, which are very exciting."

When asked what was their interest level in science the following denotes the common responses given:

Physical interaction (hands-on learning) and cognitive challenges, which are components of experimental discovery, is the interesting segment of science. The traditional academic segment of reading, writing, and problem solving is viewed as boring.

Specific examples of responses were:

CP1 "It depends. I think mixing and making chemical reactions is interesting. Studying plants and kingdoms and reading text books is boring."

CP3 "I like to know how things are made, such as rockets which I find very interesting. There is too much reading in science. I don't like to read sometimes. I just like to do things."

CP5 "What's so interesting is that we can have an answer from doing an experiment one day and the teacher tells us to do it over the next day and we can have a totally different answer. Boring, we have to write down observations and all that stuff."

When asked if they shared their experiences from the SSA with their parents, the following represents the major responses:

Yes, all of the students shared their experiences with their parents. Most often conversations took place as a result of hand-outs/work sheets that accompanied the students home. The hand-outs generated questions from the parent which induced a discussion, about the experiments for that day. Note all of the discussions were informal.

Examples of responses were:
CP2 "Yes, I test them to see if they had already learned the different things so we can have a discussion on it."

CP5 "Yes, we talk about what we learn every Saturday. I explain to her what I learned in class and what exercises we did and what we used and how they turned out."

CP7 "Yes, we discuss it every Saturday on the way home. Sometimes I just get in the car but because my mother is a science teacher she will bring it up and we will discuss it. And, sometimes she provides more information telling what jobs are related to what we learned."

The following depicts the findings when parents were asked if there was a specific area of science that was of interest to them:

Many were discouraged to take interest in science due to their gender, but were fascinated by the discovery portion of science and the phenomena that occur in the universe. Their specific interest ranged from mathematical science to veterinary science. Some specific examples were:

PI 1 "I think more so myself, I like chemistry. It deals with formulas and things added together and creating different things; that's what I prefer in the long run."

PI10 "Probably the area of animal studies. I like to know and see how they got here and what's their place in the animal chain."

When parents of the current participants were asked if they liked science as a child, the following denotes the major theme was generated:

Parents were not provided the same exposure, hands-on opportunities in science as their children, therefore were not as interested, but they had a profound appreciation for its importance in the world.

The following are direct responses obtained from some of the parents interviewed.
It was O.K. It wasn't necessarily my favorite subject but I liked school in general. Science was O.K. It wasn't something girls were suppose to really like.

I disliked science because it was not properly taught to me and I did not understand it. They (the teachers) didn't make it interesting to learn. I realize, today, that it's important.

It was not on the top of my list. On a scale of one to ten science was somewhere near six. Well, my interest was focused elsewhere. I was more of a social kind of person. I was more interested in dealing with social issues and not so much with the science end of things. But I do believe science is very important for kids today.

The question, Do you read science related literature and/or attend science related events, was posed to the same parents and the response commonly produced was as follows:

Yes, but in an informal fashion. Science related experiences occurred on coincidental bases. As the child continued to focus interest in science, the parent envisioned themselves reading and attending more science specific events.

Some specific responses were:

Not to set out as far as scheduling, however because of my sons interest, we find ourselves in these settings.

Yes, but informally. When I read the newspaper, I sometimes read the special weekly science section, and I may share it with him.

Yes, we have visited the local museums, like Sci-Trek and Fern Bank, because those are his interest.

When asked, How often do you discuss science related topics with your child, the parents of the current SSA participants responded:

In an informal and infrequent fashion. Most often, discussion would generate from topics introduced on
television, news or magazines. Other sources of science discussion was generated from leisurely reading of magazines and newspapers.

OTHER INFLUENCES

The generative questions used to acquire the data for other influences that contribute to motivation, participation, and attitude towards science for both parent and children, were as follows:

CSPQ-
4. - Had you considered a career in science prior to participating in the SSA?
5. - Have you ever produced a science report, project, display or participated in a science fair or contest?

PQ
6. - When your child comes to you with a science or math related problem that you do not understand, how do you handle the situation?
8. - What career aspirations do you have for your child?

The following indicates the major theme created when the current SSA participants were asked if they had ever produced a science report, project, display or participated in a science fair or contest?

Overwhelmingly, all responded yes they participated in a science or science related fair, with specific details of the project. Parents served as a support system providing resources needed to complete the project.

Examples of specific responses were:

CP5 "I did a project on recycling where I had to write a report and keep a journal and in the end I had to make a display too. My mother got all the stuff I needed."

CP7 "Yes, last week, I won first place in a science fair. My project was on electricity. Using a 16 volt battery and concepts of a basic motor, I produced an electronically powered propeller."
When asked if they had ever considered a career in science, prior to participating in the SSA, the following details the greatest responses:

For some, participation in the SSA had functioned to maintain their consideration towards a science oriented career. For others, participation in the SSA had enhanced their consideration to select a science oriented career. The question of whether participants had previously considered science oriented careers or not, at the time of interview had resulted in several responses that identified a specific science oriented profession with examples as oceanographer, dermatologist, and biologist.

Some specific responses were:

CP3 "Yes I had considered it before. I’m interested in rockets. I want to be an Aerospace engineer."

CP9 "Basically, I want to be an Oceanographer. The SSA has helped me to decide whether I will be a scientist because the things we do in science help me to learn more about science whether or not I become one."

When parents were asked how they handled science or math related problems brought to them by their child the following is the most common theme generated.

Parents possess a very positive attitude and expressed confidence in obtaining the appropriate resources.

PI 1 "I explain to her what the situation is and find the resources for her to deal with that situation."

PI 3 "I have a set of encyclopedias, CD Rom computer and dictionary with everything in it to assist him."

PI 7 "Obviously, I have a very positive attitude. I find out what the exact problem is and I show him that there is an answer for everything and that nothing is too difficult."

When the parents of the current SSA participants were asked which career aspiration they had for their child, the
following denotes the major responses given:

All expressed the common desire for their children to be happy and be the best at whatever they do. Realizing that the world is rapidly advancing in science and technology, they revealed that they would be proud to see them choose a science oriented career.

Some examples of specific responses were:

PI 8 "Well, she has mentioned to me on several occasions that she wants to be a doctor. And what I've tried to do, with that in mind, is help her understand the full breadth of the types of science and math she will have to be involved in. I also have shown her that, even if she doesn't continue to have interest in medicine, an informed her that she could go into research or maybe pharmacy or some other science related career. So far that continues to be her interest."

PI10 "I obviously assume that he will go to college, no question in my mind, because he has the ability. Knowing the job market and such I would hope that he would go into something that is math or science technology related. Whatever he chooses to do, I will encourage him."

PI1 "Naturally I want her to be happy. I encourage her to be part of programs like this because I know it's hard for Blacks to get jobs. So I would hope that she selects a job in the science industry if not in the computer science industry."
CHAPTER V

CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

The purpose of this study was to investigate the possible relationship between parent and student interaction in science learning. More precisely, this study tried to assess the magnitude that parental involvement might have upon students motivation, participation, and perception of science.

The guided questionnaires, Current Student Participant Questionnaire (CSPQ) and Parent Questionnaire (PQ), were research specific instruments used to individually assess the students and the parents motivation, participation, and perception levels in science. Responses to the research hypotheses were satisfied through pairing selected questions from the student and parent questionnaires that were drawn from the major themes/responses, created through the established categories.

1. Self Concept of Science and Science Careers
2. Science Interest
3. Other Influences

Discussions and interpretations of the comparisons follows the established format of the categories.

Self Concept of Science and Science Careers
Within this category, the questions were posed to assess both the parent and child’s understanding of science.

Ninety percent of the parents interviewed, found responding to question #1 from the PQ difficult to answer. Strikingly, one parent saw a direct relationship between math and science. The perception of science, for the students interviewed, might be linked to the limited scope parents had of science. Parents gave an abstract definition of studying the universe, which resembled the students definition.

When examinations of question 6 from the CSPQ and question 5 from the PQ, the following correlations were made:

-Both parent and child felt that they (the parents) possessed adequate knowledge of science.

-When children have a positive image of either parents’ background or knowledge base in science and math, a nurturing environment is created where the child feels secure in asking questions related to the subject topic, without generating anxiety over science and math.

-When a parent possesses a background or knowledge base of a particular topic, in science or math, they can better assist their children.

-The assumption drawn was, if a child perceived that a parent maintained an adequate knowledge in science and math, the
child would be apt to refer to them when a problem or question arose.

Science Interest

No specific correlations could be made between question #2 of the CSPQ and questions of the PQ, because the PQ did not ask parents to scale their level of interest in science. However, through emergent data, many parents compared their interest level in science to their interest level of another subject.

The following correlations were drawn from the responses generated via question #3 of the CSPQ and questions #2 and #3 of the PQ, as they related to science interest.

- Parents, as well as children are fascinated with discovery through experimentation and hands-on learning of science.
- Those parents, who were discouraged to take interest in science and math as children are awed by the phenomena that are characteristic of all the disciplines of science.
- In addition, parents, like the students, were able to identify a specific area of interest in science despite the disparities that exist during their childhood.

- A spirit of authority is created by the parent when a parent displays interest and knowledge in a specific area of science.

Themes contrived in question #7 of the CSPQ and questions #4 and #7 of the PQ brought about the following
correlation.

- Formal or informal discussions of science oriented topics promote greater knowledge and interest in science. When parents take an interest in what a child is learning they are providing children with a safe haven (environment) where they can be heard and valued.

- Through positive verbal exchange students inadvertently are motivated to inquire more about science.

- The assumption is, through planned or spontaneous science oriented activities, children and parents increase their individual understanding and appreciation of science.

**Other Influences**

The following correlations were generated from question # 4 of the CSPQ and #8 of the PQ:

- Parents along with the children interviewed, clearly identified the benefits of a science oriented profession. They both saw the future as being very science specific.

- Along with identifying science oriented careers as beneficial, parents were cognizant of the racial and gender disparities in science careers. They recognized an important need for their children to have a science related career.

- The assumption is through acknowledgment of the benefits and trends in the future of science, both parents and children are raising their perception of science and science careers.
Implications

The following implications can be drawn from this study:

1. Parental involvement in academic tasks will contribute to the effectiveness of children's education.

   Parents make an investment in their child's education by participating in their learning process. The notion that parents should participate, when asked and keep away when not is not appropriate in today's society.\(^\text{25}\)

2. Students will benefit from enrichment programs that provide more hands-on interactive learning.

   Contending that students learn from doing, and antiquated teaching ideas will not help propel students to academic achievement. Hands-on discovery exercises, which are characteristic of most enrichment programs, provide students with a physical perception of science.

3. Positive parental reinforcement will create greater security in science and math.

   When parents provide an atmosphere of support, where inquiries can be made and anxieties dispelled, student's motivation and participation in science increases.

The conclusions found in this exploratory study support the research findings of researchers such as Epstein and Bennet. Epstein contends that when schools and parents cooperate, children learn more. Bennet argues that there is a benefit to parents themselves, as they gain confidence and expertise in helping their children succeed academically.\textsuperscript{26}

The review of related literature revealed that parental involvement has a significant impact on the level of student achievement. This exploratory research demonstrated that effective parental involvement and heightened parent school relations effectively increase the motivation, participation, and perception of science among students.

Recommendations

As a result of the findings of this research, the following recommendations are made:

1. Science enrichment programs should develop a structured parent component for their programs.

2. To increase the scope of science among children, parents should incorporate activities and discussions that relate to science.

3. To achieve academic success among students, schools and parents should create formal co-educational roles for the parent.

\textsuperscript{26}Emma Violard-Sanchez, \textit{Fostering Home and School Cooperation: Involving Language Minority Families as Partners in Education}, 8.
4. It is recommended that further study be done in the area of parental involvement to determine the most effective way to utilize parents in the educational process.

5. It is recommended that further research studies be conducted to determine the correlation between parental involvement and children in the area of science achievement.
APPENDICES
APPENDIX A
CURRENT STUDENT PARTICIPANT QUESTIONNAIRE

1. What do you think studying science is all about?
2. On a scale from one to ten being the highest and one being the lowest, rate your level of interest in science?
3. Is science interesting or boring in your opinion?
   a. What is it about science that you find most interesting?
   b. What is it you find most boring about science?
   c. Why?
4. Had you considered science as a career before coming to the SSA?
5. Have you ever produced a science report, project, display and/or participated in a science fair or contest?
6. Do you think your parents have a good understanding of science?
7. Do you share the activities that you learned in the SSA with your parents?
APPENDIX B
PARENT QUESTIONNAIRE

1. Please briefly define what the study of science means to you.
2. Is there any area of science that is of particular interest to you?
3. As a child did you like or dislike science? Explain.
4. How often do you discuss science related topics with your child?
5. Do you feel that you possess adequate knowledge of science as to assist your child with science?
6. When your child comes to you with a science or math related problem that you do not understand, how do you handle the situation?
7. Do you read science related literature and/or attend science oriented events?
8. What career aspirations do you have for your child?
CONSENT FORM

I agree to participate, and give my child permission to participate, in the research being conducted jointly by Clark Atlanta University and Ohio State University, about the Saturday Science Academy. I understand that participation is entirely voluntary and that I can withdraw my consent at any time during the course of the research without penalty.

I understand that:

1. The research project is for the purpose of identifying and recording things that make the Saturday Science Academy successful, so that others may learn from CAU's Academy.

2. The research requires that parents, students, teachers, etc. be requested to participate in interviews on related to the SSA; that members of the research team observe in the SSA classes; and that the creative writings and plays about science produced by the participants be read and/or observed by members of the research team.

3. There are no foreseen discomforts or stresses that may be faced during this research.

4. There are no foreseen risks that will be experienced by participants.

5. The research will not affect the usual functioning of the Saturday Science Academy.

6. The Project Director for CAU will answer any questions about the research at any time during the course of the project.

Signature of CAU Project Director

Signature of parent or participant

January 23, 1993

Date

Date

PLEASE SIGN AND RETURN THIS FORM WITH YOUR CHILD NEXT WEEK
BIBLIOGRAPHY
BIBLIOGRAPHY


BIBLIOGRAPHY--continued


