CHAPTER III
METHODOLOGY

Introduction

As a part of the magnet school initiative within a large school in the southeastern region of the United States, the Aerospace Technology Magnet Program was implemented at one of four middle schools within the division. The purpose of this causal-comparative study was to determine if the Aerospace Technology Magnet Program (ATMP) is effecting achievement, attendance, and the perceptions of parents. The variables identified and chosen for this study were selected after a review of literature on magnet school program and achievement was completed. The following design was proposed to assess the degree to which the Aerospace Technology Magnet Program at Hunt-Mapp Middle School has been effective in Portsmouth Public Schools. This chapter provided information related to the subjects to be studied, data that was collected, and how it was analyzed.

Subjects

The school district consisted of three high schools, four middle schools, nineteen elementary schools, and three special centers. The student population studied was selected from those eighth grade students that attended the middle school within the district which had the Aerospace Technology Magnet Program as a part of overall educational program. Data was collected for eighth grade students enrolled in the school during the 1996-97 school year. This particular middle school had an eighth grade enrollment of 373 students. The majority of the eighth grade students were African-
American (75%). The second largest racial group was White (25%). Females represented 51% of the eighth grade population (193), and 49% of the eighth graders were males (179). There were 12 eighth grade classes, four of which were included in the magnet program. Seventy-one percent of the students at the school received free or reduced lunch.

Data was collected on eighth grade students enrolled in the magnet program and those eighth grade students not enrolled. Data was collected indicating each student’s socio-economic status. Demographic information was collected on gender, race/ethnicity, and the students’ sixth grade Literacy Passport Test scores. Parent data was collected from a survey that was sent home to a sample of parents of students that attend Hunt-Mapp Middle School.

**Statistical Analyses**

The effectiveness of the Aerospace Technology Magnet Program was objectively measured relative to its effect on academic achievement, attendance and perceptions of the program. Statistical analyses focused on three different independent variables which consist of group membership, gender, and race and three dependent variables - achievement, attendance, and perceptions of the program. Independent variables were measured on the nominal scale of measurement, and the dependent variables were measured on the interval scale of measurement. Socio-economics status (SES) and Literacy Passport Test (LPT) scores were used as a covariates because of their relationship to the dependent variables.
All tests for significance were set at the .05 predetermined alpha level of probability. The data was reported in narrative and tabular form. Statistical Package for the Social Sciences (SPSS) was used to process all data because of its comprehensive and integrated capabilities in managing, analyzing and displaying data (Gall, Borg, and Gall, 1996). The following sections of this chapter list the types of analyses and procedures for each research questions stated in Chapter I.

**Racial Balance**

How effective has the Hunt-Mapp Middle School Magnet Program been in mirroring the balance of the racial/ethnic student composition of the district?

**Procedure.** A chi square analysis, non-parametric statistical test, was used to examine the effectiveness of the Hunt-Mapp Middle Magnet Program in mirroring balance of the racial/ethnic composition of the district. The percentage of students enrolled in the program from 1993-94 through 1996-97 was examined for racial composition with specifically the black and white students in the program. Data were collected for each year on the total number of students in membership by the September 30th count. It was compared with the racial composition of that of the three other middle schools in the district to find out if the percentages of the program mirrors that of the district. The chi-square analysis was used to make this determination between expected and observed frequencies at the predetermined alpha level of .05.
Participation

Is there a difference in the amount of participation of students in the Aerospace Technology Magnet Program at Hunt-Mapp Middle School?

Procedure. Descriptive data were gathered to explain the amount of participation over the four years that the magnet program was in existence at Hunt-Mapp Middle School. Information was also gathered on the number of students that were on the waiting list for the program.

Achievement

In determining the effectiveness of Hunt-Mapp Middle School Magnet Program in improving, the following research questions was stated:

How well do students in the Hunt-Mapp Middle School Magnet Program, black and white students, and male and female students perform academically as measured by the Stanford Achievement Test?

a. Is there a statistically significant difference in math achievement on the Stanford Achievement Test (after controlling of the initial differences in SES and LPT scores) for:

- gender (male and female)
- race/ethnicity (black and white)
- group membership (magnet and non-magnet)
- group membership x race/ethnicity
- gender x group membership
- race/ethnicity x gender
- gender x race/ethnicity x group membership?
b. Is there a statistically significant difference in science achievement on the Stanford Achievement Test (after controlling for the initial differences in SES and LPT scores) for:
   - gender (male and female)
   - race/ethnicity (black and white)
   - group membership (magnet and non-magnet)
   - group membership x race/ethnicity
   - gender x group membership
   - race/ethnicity x gender
   - gender x race/ethnicity x group membership?

c. Is there a statistically significant difference in reading achievement on the Stanford Achievement Test (after controlling for the initial differences in SES and LPT scores) for:
   - gender (male and female)
   - race/ethnicity (black and white)
   - group membership (magnet and non-magnet)
   - group membership x race/ethnicity
   - gender x group membership
   - race/ethnicity x gender
   - gender x race/ethnicity x group membership?

d. Is there a statistically significant difference in language arts achievement on the Stanford Achievement Test (after controlling for the initial difference in SES and LPT scores) for:
   - gender (male and female)
   - race/ethnicity (black and white)
   - group membership (magnet and non-magnet)
   - group membership x race/ethnicity
   - gender x group membership
   - race/ethnicity x gender
   - gender x race/ethnicity x group membership?
e. Is there a statistically significant difference in social studies achievement on the Stanford Achievement Test (after controlling for the initial differences in SES and LPT scores) for:

- gender (male and female)
- race/ethnicity (black and white)
- group membership (magnet and non-magnet)
- group membership x race/ethnicity
- gender x group membership
- race/ethnicity x gender
- gender x race/ethnicity x group?

Procedure. The Stanford Achievement Test Form 9-TA, developed by Hartcourt-Brace Education Measurement and selected for statewide administration, was used because of its strong reliability and validity properties. Extensive item calibration was employed by the developers of the Stanford Achievement Test (SAT) to develop scaled scores which were comparable across forms and levels of the test. Reliability studies of the SAT have consistently reported high reliability. Of the 280 Kuder-Richardson coefficients reported, 68% are above .90 and 97% are above .80. SAT validity was achieved by the use of statistical procedures to eliminate items that did not meet predetermined psychometric specifications (Conoley and Impara, 1995). A panel of minority-group educators reviewed the tests to evaluate possible ethnic, sex, socio-economic, cultural, or regional bias.

The test data were collected in the summer of 1997 based on the administration that was collected in the spring of 1997. Analysis employed were five separate three-way ANCOVA’s for the dependent variables. The dependent variables are, math achievement, science achievement, reading achievement, language arts achievement, and social studies
achievement. Independent variables were group membership, (those enrolled in Hunt-Mapp Middle School Magnet Program and those not enrolled in the program), gender (male and female), and race/ethnicity (black, white). The covariates in this study were socio-economic status and the LPT scores.

**Attendance**

The following research questions were answered through analysis of the attendance data:

How effective is the Aerospace Technology Magnet Program in increasing student attendance?

a. Is there a statistically significant difference in attendance (after controlling for initial differences in SES and LPT scores) for:
   - gender (male and female)
   - race/ethnicity (black and white)
   - group membership (magnet and non-magnet)
   - group membership x race/ethnicity
   - gender x group membership
   - race/ethnicity x gender
   - gender x race/ethnicity x group?

**Procedure.** The 1996-97 attendance data was obtained for students enrolled in the Aerospace Technology Magnet Program for the period of 1993-94 through 1996-97 for student not enrolled in the program. The average attendance of the groups were compared. A three-way ANCOVA was used to determine if there is a significant difference.
School Effectiveness

How effective is the Aerospace Technology Magnet Program relative to the perceptions of parents to the correlates of school effectiveness?

Procedure. To address this area a survey was developed to secure data concerning perceptions of attitude towards how effective the Aerospace Technology Magnet Program is at meeting its goals. It will test the null hypothesis: There is no statistical significant difference between parents (magnet and non-magnet) and gender (male, female) with respect to perceptions of the magnet program.

Existing school effectiveness survey instruments were reviewed and the researcher decided on Dayton, Ohio’s survey, with modification. To ensure content validity, a group of educators, the researcher (assistant principal), supervisor of assessment and evaluation, and director of researcher and student services, independently placed the items on the survey in three categories: teacher effectiveness/expectation, safe and orderly climate, and home school partnership. A discussion was done on certain items and it was determined that a fourth category, instructional leadership, was needed based on the effective school correlates (Levine, 1990). The items were reviewed again which resulted in 100% agreement. The items were tallied to see how many were in each category.

Eight items were associated with teacher effectiveness/expectation; safe and orderly climate had six; and five items were linked to home school partnership. There were only two items for instructional leadership. The group identified 12 potential items
in order to have more items in the instructional leadership category. The items were agreed upon for the additional statements under instructional leadership. The survey was developed using a five-point grading Likert scale, which will have more discrimination among the items.

The survey instrument was reviewed by seven experts in order to gain feedback on the domains and the structure. Final revisions were then made to the survey instrument. For each item, descriptive statistics (e.g. means and percents) were provided for Hunt-Mapp Middle School overall and those overall in the magnet program and those not in the magnet program. A cover letter was created to accompany the survey which was sent home to a 20% random sample of parents at Hunt-Mapp Middle School.

A t-test was performed to determine if there was a statistically significant difference between the perceptions of the parents of students in the magnet program at Hunt-Mapp Middle School and the parents of students not enrolled in the magnet program.

Summary

The purpose of this study was to determine the effectiveness of participation in the Aerospace Technology Magnet Program at Hunt-Mapp Middle School. This purpose of this chapter was to acquaint the reader with a description of the research methodology which was used in this study, a description of the subjects under study, descriptions of the instruments used to measure the dependent variables, and a description of the statistical procedures that was followed. After reviewing the literature on magnet school program
and achievement, variables were identified and selected for this study. A chi square analysis was used to determine the effectiveness of the magnet program in mirroring the racial/ethnic balance of the school district. A series analysis of covariance tests were employed in measuring the differences in student achievement and attendance. Descriptive data and a t-test employed to explain results from a parent survey based on their perceptions of the school’s effectiveness. Chapter four presents the results of the analyses and explanation of charts and tables.