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ABSTRACT

The purpose of this ex-post facto study was to determine whether or not all students have an equitable chance of winning in science fair competitions. Winners and nonwinners at local, regional, and state levels of 1994 Mississippi science fair competitions were compared for the following variables: project cost, status of participation (voluntary or required and graded or ungraded), computer and/or word processor utilization, location of computer and/or word processor used, utilization of outside help, and parental educational level and occupation. A stratified random sampling technique was utilized to select subjects (N=372). Data were collected via a questionnaire developed specifically for the study and sent to parents of the sample contestants. Quantitative analysis of the data indicate that all students do not have an equitable chance of winning in science fair competitions. At all levels, students using a computer and/or word processor for project preparation have a better chance of winning and having this equipment in the home is advantageous. At the state level, students receiving outside help are more likely to win. At the regional levels, contestants participating voluntarily, having higher project costs, and college educated parents employed in professional occupations have a better chance of winning. Contains 11 references. (Author/JRH)

A COMPARISON OF 1994 MISSISSIPPI SCIENCE FAIR WINNERS AND NONWINNERS AT THE LOCAL, REGIONAL, AND STATE LEVELS OF COMPETITION

by

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ABSTRACT

The purpose of this ex post facto study was to determine whether or not all students have an equitable chance of winning in science fair competitions. Winners and nonwinners at local, regional, and state levels of 1994 Mississippi science fair competitions were compared for the following variables: project cost, status of participation (voluntary or required and graded or ungraded), computer and/or word processor utilization, location of computer and/or word processor used, utilization of outside help, and parental educational level and occupation. A stratified random sampling technique was utilized to select subjects from local, regional, and state science fair contestants. Samples for each of the five groups above the local nonwinner level consisted of 42 subjects, for a total of 210. The local nonwinner sample had 162 subjects. Data were collected via a questionnaire developed specifically for the study and sent to parents of the sample contestants. Data were analyzed using SAS/STAT software; Fisher's exact test was used to test for significance of difference. The major finding of the study was that all students do not have an equitable chance of winning in science fair competitions. At all levels, students using a computer and/or word processor for project preparation have a better chance of winning; having this equipment in the home is advantageous. At the state level, students receiving outside help are more likely to win. At the state and regional levels, contestants participating voluntarily, having higher project costs, and college educated parents employed in professional occupations have a better chance of winning.

INTRODUCTION

The competitiveness of science fairs is well documented (Burtch, 1983; Collette & Chiapetta, 1989; Gifford & Wiygul, 1992; and McBride & Silverman, 1988). The position

statement on science fairs, approved in 1968 by the National Science Teachers' Association (NSTA, 1984) stated in part that student participation in science fairs should be voluntary and not the basis for a course grade. Contrary to this reccommendation, a science fair project is frequently a graded requirement for successful completion of a science course. In a survey conducted by Brown, Bellipanni, Brown, Pendarvis, and Ferguson (1986), 64% of the 461 students participating in the 1985 Mississippi Region I Science Fair reported that projects were required and graded. In addition to the competition for grades, the prestige of winning at science fair competitions and the financial rewards of winning prizes such as the Westinghouse Award, can encourage competitive projects.

Collette and Chiappetta (1989) warned that parents may get overly involved in science fair projects when the competition gets fierce; in these instances the projects tend to reflect parental rather than student ability. These authors stated, "Children whose parents are affluent or professionals in medicine, engineering, and scientific fields have a distinct advantage and usually win science fair competitions" (p. 184). However, no literature was cited, nor were any data presented, to substantiate this claim.

Brown et al (1986) cited technical problems and financial considerations among the most difficult obstacles for students to overcome in science fair project work. In a survey study of the participants in the 1987 Mississippi Region V Science Fair, Gifford and Wiygul (1992) found that a higher cost of developing the project was an important variable for positively enhancing a contestant's chances of winning at a regional science fair. Winners indicated a cost of $50-$75 per project, while nonwinners spent only $25-$50 per project. Olson (1985) found that while a winning science fair project could still be constructed for under $20, the majority of the contestants at the North Dakota Science and Engineering Fair

in the 1980s spent over $100.

Utilization of a computer and/or word processor (equipment more likely to be found in affluent homes) in preparing the project display and report could also be a factor in winning or not winning at a science fair. Fredericks and Asimov (1990) stated, "The quality of a [science project] display is often judged by the attractiveness of signs, titles, and written descriptions" (p. 3). These authors advised that computer graphics programs should be used to create labels, titles, and signs.

The dearth of data on the family backgrounds of science fair contestants indicated a need for specific research to determine whether or not students having less educated and/or nonprofessional parents were at a disadvantage in science fair competitions. If so, the inequity would be exacerbated if science projects were required and graded components of the science curriculum.

Statement of the Problem

The purpose of this study was to determine whether or not all students have an equitable chance of winning in Mississippi science fair competitions. Winners and nonwinners at local, regional, and state science fairs, as well as state winners and local nonwinners, were compared for the following variables: (1) project cost, (2) status of participation (voluntary or required and graded or ungraded), (3) computer and/or word processor utilization, (4) location of computer and/or word processor, (5) utilization of outside help (defined as assistance from anyone other than parents or science teacher), (6) maternal educational level, (7) maternal occupation, (8) paternal educational level and (9) paternal occupation.

METHODS

Sample

This investigation was conducted ex post facto in that sampling was done and data collected after all of the 1994 Mississippi science fairs had been held and winners had been announced. Selection of the state winner sample was not random, as these subjects had already been chosen, based on project merit, by science fair judges. Random stratified samples were selected from the population of 1994 Mississippi science fair contestants for the following groups: state nonwinners, regional winners and nonwinners, and local winners and nonwinners. Sampling at all three levels was limited to high school contestants (Classes Four and Five) in the following seven categories: behavioral sciences, botany, earth and space sciences, medicine and health, chemistry and biochemistry, environmental sciences, and microbiology. Sampling was limited to these popular categories in order to assure sufficient numbers of subjects at all levels to provide an adequate sample.

Sampling started with the state winners at the 1994 Mississippi Science and Engineering Fair and continued retrogressively to the local nonwinners. Only first, second, and third place winners in each of the seven categories and two classes involved in the study were included in the sample of state winners. In order to provide a more distinct separation between winners and nonwinners, fourth and fifth place winners and honorable mention placements were omitted when selecting winners and nonwinners at each level, but were included when selecting samples for the next lower level.

For each state winner, a nonwinner from the same class and category was randomly chosen. Each sample (winners and nonwinners from all three levels, except for local nonwinners) consisted of 42 subjects (seven categories x three placements x two classes).

The total number of subjects in the five upper levels of the study (state winners and nonwinners, regional winners and nonwinners, and local winners) was 210.

Since all contestants at the state science fair were regional winners, that sample was randomly selected from the contestants remaining in the seven categories of the two classes after state level winners and nonwinners had been chosen. For each regional winner, a corresponding nonwinner from the same region, class, and category was randomly selected from computer printouts of regional science fair data.

Since all contestants at Mississippi's regional science fairs were local winners, that sample was randomly selected from the contestants remaining in the two classes and seven categories after the regional winners and nonwinners had been chosen. Each local winner was matched to a regional nonwinner for category, class, and region.

Because all contestants in the five upper levels were winners in at least one competition, original plans were to have an equal number (210) of local nonwinners in the study. In order to complete the sampling for the study, the principal of each school represented by a local winner was asked to provide names and home addresses of six students who had not placed or received Honorable Mention at that school's local science fair. In addition to these 42 principals, local administrators from 18 more schools which had one or more regional winners in the classes and categories included in the study were asked to supply lists of local nonwinners. Names and addresses of principals were found in the Mississippi Educational Directory 1993-94 published by the State Department of Education.

A total of 60 principals was sent a letter briefly describing the study and requesting professional help. Accompanying each letter was a stamped, self-addressed return envelope and a form for filling in the school name and student names and addresses. Approximately

three weeks after the first letter was sent, a second and different letter along with another stamped, self-addressed envelope and form was sent to each principal who had not responded. No further attempt was made to obtain local nonwinner names from principals beyond this second correspondence.

Instrument

The descriptive method of survey research was utilized to collect the data through use of a questionnaire sent to parents of the sample contestants. Since no suitable questionnaire existed, an instrument was constructed based on the variables to be tested in the study. The questionnaire consisted of 13 items on three pages. Content validity was tested by administering the questionnaire to parents of students who had participated in the W. A. Higgins Junior High School's 1994 science fair in Clarksdale, Mississippi. Because of the simple and straightforward nature of the questions a pilot test of the instrument was deemed by the doctoral committee to be unnecessary.

Data Collection and Analyses

Data were obtained from parents of the science fair contestants in the sample groups in the following way. During June through August, 1994, parents were sent these materials: a cover letter explaining the purpose and significance of the study; a questionnaire; and a stamped, self-addressed return envelope. Addresses on the return envelopes were coded so that the questionnaire data could be ascribed to the appropriate subject. Approximately two weeks after the initial mailout, nonrespondents were sent a second questionnaire accompanied by another self-addressed, stamped, coded envelope, and a different cover letter. No additional mailouts were made.

Collected and tabulated data were analyzed using SAS/STAT, Proprietary software

Release 6.04 (SAS Institute, 1987). In order to obtain valid results from nonparametric statistical tests, some questionnaire options for each of the following variables were combined: project cost, maternal educational level, and paternal educational levels. Fisher's exact test (two-tail) was used to test the significance of differences between winners and nonwinners for the following dichotomous categories of variables: (1) project cost ($50 or less and more than $50), (2) status of participation (voluntary or required and graded or ungraded), (3) use or no use a computer and/or word processor, (4) outside help or no outside help, (5) maternal educational level (college graduate or noncollege graduate), (6) maternal occupation (professional or nonprofessional), (7) paternal educational level (college graduate or noncollege graduate), and (8) paternal occupation (professional or nonprofessional). The United States Department of Labor publication Dictionary of Occupational Titles (1977) was used to categorize parental occupation as professional or nonprofessional.

Differences in the frequencies reported for each variable by the winner and nonwinner groups were concluded to be significant if $p \leq .05$. The data from each level of science fair competition (local, regional, and state) were analyzed separately, and in addition the state winner and local nonwinner levels were compared for all variables.

RESULTS

Response Rates

Twenty-seven (45.0%) principals sent lists of valid nonwinner names. Eleven (18.3%) other principals replied, but gave no local nonwinner names for the following reasons: two apparently misunderstood the request and sent names of regional nonwinners; two refused to comply, citing the Family Rights and Privacy Act (Buckley Amendment) as

prohibiting such disclosures; one had just begun duties as principal of that school and did not have the information; and six said there were no local nonwinners at their school's science fair. The remaining 38 principals (63.3%) contacted did not reply at all after two contacts. Thus, names and addresses of only 162 local nonwinners were obtained. This was fewer than the sample of 210 local nonwinners planned for in order to equal the total number of subjects in the five upper level groups.

Table 1 presents the number and percent of responses received from each level and group of subjects by region as well as the total number of responses received per group and the percentage of return. Decimal places were rounded to the nearest whole number. The overall response rate was 74% with 274 of the 372 subjects replying. The response rate by group was as follows: state winner, 93%; state nonwinner, 81%; regional winner, 81%; regional nonwinner, 71%; local winner, 74%; and local nonwinner, 65%. The overall percentages of representation by region were as follows: Region 1, 18%; Region 2, 12%; Region 3, 16%; Region 4, 7%; Region 5, 19%; Region 6, 10%; and Region 7, 18%.

Test of Research Variables

Differences between winners and nonwinners for the dichotomous categories of project cost were significant at all levels except local (Table 2). At the local level, 90.6% of the nonwinners spent $50 or less, and 96.8% of the winners spent that amount. At the regional level, 100% of the nonwinners spent $50 or less, while 55.9% of the winners spent more than $50. At the state level, only 35.3% of the nonwinners spent more than $50, while an overwhelming majority (89.7%) of the winners spent more than $50. The greatest difference in project cost occurred between the local nonwinner group and the state winner group, where the percentages were nearly direct opposites; 90.6% of the local nonwinners

spent less than $50, while 89.7% of the state winners spent more than $50.

Table 3 presents the frequency and percent of responses to all five levels of project cost listed on the survey instrument. No state winner spent less than $25 on project development. Almost half of the state winners (48.7%) spent more than $100, while another 33.3% spent $76 to $100. Thus, the majority (82.0%) of state winners spent from $76 to over $100. Only 11.7% of the state nonwinners spent that amount. At the regional level, no nonwinner spent more than $50 while 55.9% of the winners spent from $51 to over $100. Of those, 26.5% spent over $100 on project development. At the local level, the majority of both winners (71%) and nonwinners (62.3%) spent $50 or less. Ten (9.4%) of the local nonwinners spent $50 to more than $100, while only one ((3.2%) of the local winners spent that amount.

Differences in voluntary or required participation between winners and nonwinners were significant at all levels except local (Table 4). At the local level, 60.4% of the nonwinner projects were required as compared to 64.6% of the winner projects. At the regional level, 63.3% of nonwinner projects were required, while 64.7% of the winner projects were voluntary. At the state level, 61.8% of nonwinner projects were required, and 76.9% of the winner projects were voluntary. When local nonwinners were compared to state winners, 39.6% of the local nonwinner projects were voluntary, while 76.9% of the state winner projects were voluntary. Overall, 129 (47.1%) of the projects were voluntary and 145 (52.9%) were required.

The difference in status of participation (graded or not graded) between winners and nonwinners at all three levels was not significant (Table 5). However, the difference between state winners and local nonwinners was significant at $p \leq .001$. Less than 4% of

the local nonwinner projects were ungraded while more than 25% of the state winner projects were ungraded. Overall, 248 (90.5%) of the 274 projects were graded and 26 (9.5%) were ungraded; slightly more than half (50.7%) of the overall projects were both required and graded; and 30 (46.9%) of the 64 regional projects, those of winners and nonwinners, were both graded and required.

The difference in computer and/or word processor usage between winners and nonwinners was significant at all levels except regional (Table 6). At the local level, the majority (56.6%) of the nonwinners did not use a computer and/or word processor in project preparation, while the majority (77.4%) of the winners did. At the regional level, most of the subjects, both winners and nonwinners, used a computer and/or word processor; 73.3% of the nonwinners utilized this equipment, while an overwhelming majority (91.2%) of the winners did. This 17.9% difference was not significant at $p \leq .05$; however, it would have been significant if $p \leq .1$ had been used. At the state level, 70.6% of the nonwinners used a computer and/or word processor, while all but one (97.4%) of the winners did. When local nonwinners were compared to state winners, the difference was significant at $p \leq .001$, with 60 (56.6%) of the local nonwinners not using a computer and/or word processor in project preparation as opposed to only one (2.6%) state winner who did not.

The data pertinent to computer and/or word processor location were compiled to show the overall frequency and percent of responses in the three categories listed on the questionnaire: home, school, and elsewhere. The results were as follows: 110 (59.4%) of the contestants used computers or word processors at home; 50 (27.0%) used them at school; and 43 (23.2%) used them elsewhere. (The total of the percentages is over 100 because some contestants used computers or word processors at more than one location.)

There was no significant difference between winners and nonwinners at the local and regional levels for the variable of having had or not having had outside help in project development (Table 7). There was, however, a significant difference between winners and nonwinners at the state level and between state winners and local nonwinners. At the local level, 20.8% of the nonwinners and 22.6% of the winners had outside help. At the regional level, 20.6% of the nonwinners and 38.2% of the winners had outside help. At the state level, 20.6% of the nonwinners and 53.9% of the winners obtained outside help. The state winner group was the only one in which the majority of respondents reported having received outside help. Only 46.1% of the state winners did not receive outside help, while 79.2% of the local nonwinners did not.

There was no significant difference between winners and nonwinners at the local and state levels for the dichotomous maternal educational level (college graduate or noncollege graduate) variable. There was, however, a significant difference between winners and nonwinners at the regional level and between state winners and local nonwinners (Table 8). At the local level, 38.8% of the nonwinners' mothers and 53.3% of the winners' mothers were college graduates. At the regional level, the percentages were nearly direct opposites; only 34.5% of the nonwinners' mothers were college graduates, while only 35.3% of the winners' mothers were not college graduates. At the state level, 58.8% of the nonwinners' mothers and 61.5% of the winners' mothers were college graduates. When comparing local nonwinners to state winners for this variable, the statistics would be exact opposites if decimal places were rounded to the nearest whole number: 38.5 % of the state winner mothers were not college graduates while 38.8% of the local nonwinner mothers were.

There was no significance between winners and nonwinners for the maternal

occupation variable (professional or nonprofessional) at the local and state levels, but differences at the regional level and between local nonwinners and state winners were significant at $p \leq 0.005$ and ≤ 0.05, respectively (Table 9). At the local level, 68% of the nonwinners' mothers and 56.7% of the winners' mothers were working in nonprofessional occupations. At the regional level, 28.6% of nonwinners' mothers and 64.7% of the winners' mothers were employed in professional vocations. At the state level, the majority of mothers of both nonwinners (55.9%) and winners (53.8%) worked in professional occupations. Thirty-two percent of the local nonwinners' mothers as compared to 53.8% of the state winners' mothers worked in professional vocations. For this variable, there was a greater difference between winners and nonwinners at the regional level than there was between local nonwinners and state winners.

There was no significant difference between winners and nonwinners for the dichotomous paternal educational level (college graduate or noncollege graduate) variable at the state level, but there was significance at the local and regional levels and between local nonwinners and state winners (Table 10). At the local level, 71.4% of the nonwinners' fathers were noncollege graduates, while the winners' fathers were evenly divided with 50% in each category. At the regional level, 75.0% of the nonwinners' fathers and 39.4 of the winners' fathers were noncollege graduates. At the state level, 58.6% of the nonwinners' fathers and 71.8% of the winners' fathers were college graduates. The difference between local nonwinners, having only 28.6% college graduate fathers, and state winners, having only 28.2% noncollege graduate fathers, was highly significant ($p \leq .001$).

There was no significant difference between winners and nonwinners for the paternal occupation (professional or nonprofessional) variable at the local and state levels, but the

difference at the regional level and between local nonwinners and state winners was significant (Table 11). At the local level, 75.6% of the nonwinners' fathers and 62.5% of the winners' fathers were employed in nonprofessional occupations. At the regional level, only 25% of the nonwinners' fathers worked in professional vocations, while 69.7% of winners' fathers were professionals. This difference was significant at $p \leq 0.001$. At the state level, 65.5% of the nonwinners' fathers and 76.9% of the winners' fathers were professionals. The majority of the contestants' fathers at the regional winner level and above were employed in professional occupations, while the majority of the contestants' fathers at the regional nonwinner level and below worked in nonprofessional jobs. Only 24.4% of local nonwinner fathers were professionals as compared to 76.9% of the state winners' fathers.

DISCUSSION

Statistics from this study show that a higher project cost is an important factor in positively enhancing one's chance of winning in Mississippi science fair competitions at the regional and state levels. None of the regional nonwinners spent more than $50 in developing the project, while 55.9% of the regional winners spent from $51 to more than $100; of those, 26.5% spent over $100. This finding supports that of Gifford and Wiygul (1992). In a survey of the participants in the 1987 Mississippi Region V Science Fair, these authors reported that winners indicated a cost of $50-$75 per project, while nonwinners spent only $25-$50 per project.

At the state level, only 35.3% of the nonwinners spent more than $50, while an overwhelming majority (89.7%) of the winners spent more than $50. Of that 89.7%, 82.1% spent $76 to more than $100. This result agrees with Olson's (1985) report that the majority

of the contestants at the North Dakota Science and Engineering Fair in the 1980's spent over $100 on project construction.

The greatest difference in project cost occurred between the local nonwinner group and the state winner group, where the percentages were nearly direct opposites; 90.6% of the local nonwinners spent less than $50, while 89.7% of the state winners spent more than $50. None of the state winners spent less than $25 on project development, while the majority (62.3%) of local nonwinners spent that amount. These statistics show that the expenditure for project development became progressively higher as the level of competition advanced from local to regional to state.

The difference in voluntary and required science fair participation between winners and nonwinners at the local level was not significant, but at the regional level, 64.7% of the winners entered voluntarily, while a nearly equal percentage (63.3%) of the nonwinners were required to participate. Of the 39 state winners, only nine (23.1%) were required to prepare a science project. Overall, 47.1% of the projects were voluntary and 52.9% were required. Although there were only 15 more required than voluntary projects overall, the majority of winners above the local level chose to enter science fair competition. These statistics indicate that the majority of winners at the regional and state levels had reasons other than compulsory participation for developing science projects and entering science fair competitions. These reasons might include personal interest in scientific research or in a specific problem; encouragement from parents, teachers, or friends; and the desire to win awards, prizes, and/or scholarships.

There was no significant difference between winners and nonwinners at the local, regional, and state levels for the variable of graded or ungraded project. However, the

difference between local nonwinners and state winners was significant at $p \leq .001$, with more than a fourth (25.6%) of the state winners' projects being ungraded as compared to less than 4% of those of the local nonwinners. Only 14.7% of the state nonwinners and 11.8% of the regional winners did not receive a project grade. These statistics indicate that many contestants at the regional winner level and above choose to participate in science fair competition even without the incentive of grades. Evidence that receiving a project grade becomes progressively less important as the level of competition advances is demonstrated by the $p \leq .001$ significance of difference between state winners and local nonwinners.

Overall, 90.5% of the 274 projects were graded; 50.7% were both required and graded. Thirty of the 64 (46.9%) regional level projects (those of winners and nonwinners) were both required and graded. These results are less than those reported by Brown et al (1986). These authors wrote that 64% of the 461 students participating in the 1985 Mississippi Region I Science Fair reported that projects were required and graded. It is possible that in the nine-year interim between the two studies the number of Mississippi science teachers who both require and grade science projects has decreased. However, it is more likely that the large difference (397) between the number of subjects in the two studies caused the discrepancy. Results from this study also showed that, contrary to the science fair position statement of the National Science Teachers' Association (NSTA, 1984), the overwhelming majority (90.5%) of projects were graded, more than half (52.9%) were required, and slightly more than half (50.7%) were both required and graded.

The difference in computer and/or word processor usage between winners and nonwinners was significant at the local and state levels and between local nonwinners and state winners at $p \leq .001$, .01, and .001, respectively. Although 91.4% of the regional

winners used computers and/or word processors as opposed to 73.3% of the regional nonwinners, the significance of difference was slightly less than $p \leq .05$. Only one state winner did not use a computer or word processor while 38 (97.4%) did. The majority of contestants in every group except the local nonwinners used a computer and/or word processor. These results show that utilization of a computer and/or word processor significantly improves a contestant's chances of winning at the local level and is all but necessary to win at the regional and state levels.

The greatest number (59%) of computers and/or word processors were used at home, while 27% were used at school, and (23%) were used elsewhere. These results indicate that having a computer and/or word processor in the home is advantageous to a science fair contestant and having access to such equipment in the school is the next most desirable alternative. If computer and/or word processor access is not available at either of these two places, the student would be well advised to utilize this equipment elsewhere.

There was no significant difference between winners and nonwinners at the local and regional levels for the variable of having had, or not having had, outside help in project development. There was, however, a significant difference between winners and nonwinners at the state level and between state winners and local nonwinners, with the greater difference between the two latter groups. The majority of state winners (53.9%) received outside help in developing the science project. These results indicate that while outside help is not critical for winning, it does provide a slight advantage at the regional level and a significant advantage at the state level. Evidence that utilization of outside help becomes progressively more important as the level of competition advances is demonstrated by the $p \leq .001$ significance of difference between state winners and local nonwinners.

The regional level was the critical stage for showing effects of the parental educational levels and parental occupations variables. It is not surprising that the results of the educational level variable (college graduate or noncollege graduate) and those of the occupation variable (professional or nonprofessional) are similar for both parents and to each other because "extensive study...typically acquired through university, college, and technical institute training..." (Dictionary of Occupational Titles, 1977, p. 1311) is a major criterion for categorizing an occupation as professional. Results of this study indicate that a science fair contestant who advances to the regional winner level and beyond is more likely to have college educated parents employed in professional occupations. The majority of contestants having noncollege graduate and nonprofessional parents is left at the regional nonwinner level and below in science fair competitions.

CONCLUSIONS

The conclusions to this study pertaining to Mississippi science fair contestants at three levels of competition (local, regional, and state) are listed below and are presented to address the general research question: Do all students have an equitable chance of winning in Mississippi science fair competitions? 1. At the state level, a student who spends $76 to over $100 on project development has a better chance of winning. At the regional level, a student who spends more than $50 has a better chance of winning. At the local level, a student who spends $50 or less on science project development has as much chance of winning as one who spends more than $50. 2. At the state and regional levels, a student who participates in science fair competition voluntarily has a slightly better chance of winning than one who is required to participate. At the local level, a student who is required to participate has as much chance of winning. 3. A student whose project is graded is as

likely to win at all levels of competition as one whose project is not graded. 4. At the state and regional levels, it is almost imperative that a student use a computer and/or a word processor in project preparation in order to win. At the local level, a student who uses a computer and/or word processor during project preparation has a significantly better chance of winning. 5. A student who has a computer/word processor in the home has an advantage over one who does not. 6. At the state level, a student who has received outside help is more likely to win than one who has not. At the regional and local levels, a student who has not received outside help is as likely to win as one who has. 7. A student whose parents are college graduates is more likely to win at the regional level and above. At the local level, a student whose parents are not college graduates is as likely to win. 8. A student whose parents are employed in professional occupations is more likely to win at the regional level and above than one whose parents are employed in nonprofessional occupations. At the local level, a student whose parents are employed in nonprofessional vocations is as likely to win.

The following recommendations are made for further study in the area of Mississippi science fair competitions: (1) This study should be replicated to determine whether or not similar results will be obtained; and (2) A more effective way of gaining access to the local nonwinner population should be found before further research is attempted.

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Table 1. Number of responses received from each level and group of subjects by science fair region.

Science Fair Region	State winner	State nonwinner	Regional winner	Regional nonwinner	Local winner	Local nonwinner	N	%
1	5	7	10	7	7	14	50	18
2	11	4	4	3	5	6	33	12
3	2	6	6	7	7	17	45	16
4	1	4	1	0	1	13	20	7
5	14	3	6	7	6	16	52	19
6	4	6	4	0	0	12	26	10
7	2	4	3	6	5	28	48	18
Total returned	39	34	34	30	31	106	274	
Total sent	42	42	42	42	42	162	372	
% Return	93	81	81	71	74	65	74	

Table 2. Dichotomous project cost of science fair winners and nonwinners at the local, regional, and state levels.

	Frequency		Percent		
Level and group	< $50	> $50	< $50	> $50	p
Local nonwinners	96	10	90.6	9.4	>0.05
Local winners	30	1	96.8	3.2	
Regional nonwinners	30	0	100	0	<0.001
Regional winners	15	19	44.1	55.9	
State nonwinners	22	12	64.7	35.3	<0.001
State winners	4	35	10.3	89.7	
Local nonwinners	96	10	90.6	9.4	<0.001
State winners	4	35	10.3	89.7	

Table 3. Project cost presenting responses to all questionnaire choices.

Level and group		< $25	$25-$50	$51-$75	$76-$100	> $100	Total
State winners	N	0	4	3	13	19	39
	%	0	10.3	7.7	33.3	48.7	14.2
State nonwinners	N	10	12	8	1	3	34
	%	29.4	35.3	23.5	2.9	8.8	12.4
Regional winners	N	7	8	5	5	9	34
	%	20.6	23.5	14.7	14.7	26.5	12.4
Regional nonwinners	N	21	9	0	0	0	30
	%	70.0	30.0	0	0	0	11.0
Local winners	N	22	8	0	0	1	31
	%	71.0	25.8	0	0	3.2	11.3
Local nonwinners	N	66	30	6	3	1	106
	%	62.3	28.3	5.7	2.8	1.0	38.7
Total	N	126	71	22	22	33	274
	%	46.0	25.9	8.0	8.0	12.0	100

Table 4. Voluntary or required status of science fair projects of winners and nonwinners at the local, regional, and state levels.

	Frequency		Percent		
Level and group	Voluntary	Required	Voluntary	Required	p
Local nonwinners	42	64	39.6	60.4	> 0.05
Local winners	11	20	35.4	64.6	
Regional nonwinners	11	19	36.7	63.3	< 0.05
Regional winners	22	12	64.7	35.3	
State nonwinners	13	21	38.2	61.8	< 0.001
State winners	30	9	76.9	23.1	
Local nonwinners	42	64	39.6	60.4	< 0.001
State winners	30	9	76.9	23.1	

Table 5. Graded or ungraded projects of science fair winners and nonwinners at the local, regional, and state levels.

	Frequency		Percent		
Level and group	Graded	Ungraded	Graded	Ungraded	p
Local nonwinners	102	4	96.2	3.8	>0.05
Local winners	29	2	93.6	6.4	
Regional nonwinners	29	1	96.7	3.3	>0.05
Regional winners	30	4	88.2	11.8	
State nonwinners	29	5	85.3	14.7	>0.05
State winners	29	10	74.4	25.6	
Local nonwinners	102	4	96.2	3.8	<0.001
State winners	29	10	74.4	25.6	

Table 6. Use of computer by science fair contestants at the local, regional, and state levels.

	Frequency		Percent		
Level and group	Yes	No	Yes	No	p
Local nonwinners	46	60	43 4	56.6	<0.001
Local winners	24	7	77.4	22.6	
Regional nonwinners	22	8	73.3	26.7	>0.05
Regional winners	31	3	91.2	8.8	
State nonwinners	24	10	70.6	29.4	<0.01
State winners	38	1	97.4	2.6	
Local nonwinners	46	60	43.4	56.6	<0.001
State winners	38	1	97.4	2.6	

Table 7. Use of outside help by science fair contestants at the local, regional, and ıte levels.

Level and group	Frequency		Percent		p
	Yes	No	Yes	No	
Local nonwinners	22	84	20.8	79.2	>0.05
Local winners	7	24	22.6	77.4	
Regional nonwinners	6	24	20.0	80.0	>0.05
Regional winners	13	21	38.2	61.8	
State nonwinners	7	27	20.6	79.4	<0.01
State winners	21	18	53.9	46.1	
Local nonwinners	22	84	20.8	79.2	<0.001
State winners	21	18	53.9	46.1	

Table 8. Maternal educational level (noncollege graduate or college graduate) of science fair contestants at the local, regional, and state levels.

Level and group	Frequency		Percent		p
	Noncollege grad.	College grad.	Noncollege grad.	College grad.	
Local nonwinners	63	40	61.2	38.8	>0.05
Local winners •	14	16	46.7	53.3	
Regional nonwinners	19	10	65.5	34.5	<0.05
Regional winners	12	22	35.3	64.7	
State nonwinners	14	20	41.2	58.8	>0.05
State winners	15	24	38.5	61.5	
Local nonwinners	63	40	61.2	38.8	<0.05
State winners	15	24	38.5	61.5	

Table 9. Maternal occupation (nonprofessional or professional) of science fair contestants at the local, regional, and state levels.

	Frequency		Percent		
Level and group	Nonprof.	Prof.	Nonprof.	Prof.	p
Local nonwinners	70	33	68.0	32.0	>0.05
Local winners	17	13	56.7	43.3	
Regional nonwinners	21	8	72.4	28.6	<0.005
Regional winners	12	22	35.3	64.7	
State nonwinners	15	19	44.1	55.9	>0.05
State winners	18	21	46.2	53.8	
Local nonwinners	70	33	68.0	32.0	<0.05
State winners	18	21	46.2	53.8	

Table 10. Paternal educational level (noncollege graduate or college graduate) of science fair contestants at the local, regional, and state levels.

	Frequency		Percent		
Level and group	Noncollege grad.	College grad.	Noncollege grad.	College grad.	p
Local nonwinners	65	26	71.4	28.6	<0.05
Local winners	12	12	50.0	50.0	
Regional nonwinners	21	7	75.0	25 0	<0.01
Regional winners	13	20	39.4	60.6	
State nonwinners	12	17	41.4	58.6	>0.05
State winners	11	28	28.0	72.0	
Local nonwinners	65	26	71.4	28.6	<0.001
State winners	11	28	28.2	71.8	

Table 11. Paternal occupation (nonprofessional or professional) of science fair contestants at the local, regional, and state levels.

	Frequency		Percent		
Level and group	Nonprof.	Prof.	Nonprof.	Prof.	p
Local nonwinners	68	22	75.6	24.4	>0.05
Local winners	15	9	62.5	37.5	
Regional nonwinners	21	7	75.0	25.0	<0.001
Regional winners	10	23	30.3	69.7	
State nonwinners	10	19	34.5	65.5	>0.05
State winners	9	30	23.1	76.9	
Local nonwinners	68	22	75.6	24.4	<0.01
State winners	9	30	23.1	76.9	