

**MAXIMIZING OUR “OPPORTUNITY TO LEARN”:
A STUDY OF THE DSTP STUDENT SURVEY**



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Lisa A. Banicky, Ph.D., Senior Associate for Policy Analysis

Audrey J. Noble, Ph.D., Director

Pamela B. Stazesky, Ph.D., Associate Director



Delaware Education Research & Development Center
University of Delaware
Newark, DE 19716

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Executive Summary

Each year the Delaware administers a survey to all students. These data were examined in regards to issues that may affect achievement, that is, students' opportunity to learn. Each item was also examined by race to determine any differences that may exist between groups.

- 📖 Historically- high performing, that is Asian and Caucasian, students were approximately 3 and one-half to 5 and one-half times more likely to meet the reading and mathematics standards than their Hispanic and African-American peers.
- 📖 Students who indicated that they tried “very” or “somewhat” hard were more likely to meet the reading and mathematics standards. With the exception of grade 3, racial status appears to be *unrelated* to the amount of effort students reported applying on the DSTP.
- 📖 Students who reported that they felt prepared to take the mathematics portion of the DSTP were 2 to 3 times more likely to meet or exceed the math standards. Asian and Caucasian students in 3rd and 5th grade were about twice as likely to report feeling prepared as compared to their Hispanic and African-American classmates. These odds diminished in grades 8 and 10.
- 📖 Eighth and tenth grade students who reported having access to a computer at home were 3 to 4 times more likely to meet or exceed the reading and mathematics standards. Students from Hispanic and African American families, regardless of their families' income (based on free and reduced lunch data), are less likely to have computer access at home; this likelihood increases from grade 3 through grade 10.
- 📖 Students in 10th grade who indicated that they frequently used a graphing calculator were about twice as likely to meet or exceed the DSTP math standard as compared to students who used calculators less frequently. A curious pattern was found that suggested that students in the early grades (i.e., grades 3 and 5) who reported using a calculator *infrequently* were more likely to meet or exceed that mathematics standard. The odds regarding frequency of calculator use and race appear to be relatively small.
- 📖 There were no meaningful relationships between the frequency of in-class writing lessons and race.
- 📖 Students who reported at least some level of parental support were, on average, 2 to 3 times more likely to meet or exceed the reading, writing, and mathematics standards. There was no meaningful difference between the parental support reported by Asian and Caucasian students as compared to their Hispanic and African-American peers.

INTRODUCTION

More than ten years of educational reform in Delaware have resulted in an accountability system that measures student performance on an annual basis and uses this information for making decisions about students and schools. One of the original goals of the reform effort was to create a system that expected more and provided more. With these increased expectations for student and school performance comes the expectation that students will be provided with adequate “opportunities to learn.”

Opportunity to learn (OTL) is considered critical for ensuring that all students are able to meet the increased demands of performance-based accountability. Originally defined as the overlap between what was taught and what was tested, more recent definitions of OTL have expanded to include the quality of resources, school conditions, curriculum, and teaching that students experience. Researchers have long recognized that disparities in OTL exist between certain groups of students placing some students at a academic disadvantage.

The purpose of the current study was to examine the relationship between OTL, achievement, and race among Delaware students. The current study was guided by the following questions:

- What is the relationship between effort and performance on the DSTP?
- Is there a relationship between students’ feeling of preparedness and their performance on the DSTP?
- Is there a relationship between students’ access to computers and their performance on the DSTP?
- Is there a relationship between parental support and students’ DSTP performance?
- Are there content specific activities (i.e., frequency of calculator use, reading at home, frequency of writing lessons) that are related to performance on the DSTP?

METHODS

The results of this study are based on students’ responses to the DSTP student survey administered at the end of the spring 2002 testing administration. This survey is administered annually in conjunction with the Delaware Student Testing Program (DSTP) in grades 3, 5, 8, and 10. The student survey was developed by several members of the Delaware Department of Education and was designed to measure opportunity to learn within the areas of reading, writing, and mathematics (Zhang, 2001). A copy of the entire survey appears in Appendix A.

Each year the Delaware Department of Education releases an annual summary of the DSTP Student survey results. The state’s reports include item-by-item responses disaggregated by grade level, performance level, racial status, and gender. This report is designed to provide local and state policymakers’ with the “opportunity to learn” more about student, school, and home factors that are related to student achievement.

Consequently, it incorporates only a subset of the items presented on the student survey. This report seeks to provide some insight into using the available data as a starting point for investigating some of these opportunity-to-learn issues in more depth. Also, we provide recommendations should the state or local districts desire to more fully examine this topic. Finally, some methodological issues that may help the developers of the instrument should they wish to revise it are found in Appendix D.

Analyses

Each of the items on the DSTP student survey is categorical in nature. For example, in response to the question, “*Do you feel your mathematics class has prepared you to do your best on the mathematics assessment?*” students were given the responses options of yes, somewhat, not sure, and no. Likewise, racial identity and performance level achieved are also considered categorical variables. Given the nature of the data, analyses for the current study involved the examination of multi-way contingency tables.

A likelihood ratio test statistic was applied to each of the multi-way contingency tables in the current study to determine if the variables under consideration were related to one another. The likelihood ratio test statistic (G^2) compares the observed frequency associated with each cell in the multi-way table with the expected frequency of each cell assuming that the variables under consideration are unrelated. A large discrepancy between the expected cell frequency and the observed cell frequency does not support the null hypothesis that the variables are unrelated (Wickens, 1989). If the likelihood ratio test statistic was found to be statistically significant, then a second analysis was performed. This involved planned comparisons accomplished by collapsing the multi-way contingency tables into pre-determined comparisons and calculating the likelihood ratio test statistic on the reduced table. Finally, reducing the multi-way contingency tables into a 2 X 2 table aided interpretation and allowed for the calculation of an odds ratio, an effect size measure. A list of the variables included in the current study and the predetermined comparisons used are presented in Appendix B.

Response Rates

The student survey was typically administered on the final day of the assessment period. Since this timing may have contributed to the response rate, we examined it for each included item. Rates appear to be more than adequate to support the analyses conducted.

Grade Level	Minimum Rate	Maximum Rate
3	90.4%	100%
5	89.9%	100%
8	90.4%	100%
10	88.6%	100%

DISCUSSION OF FINDINGS

DSTP PERFORMANCE AND RACE

Previously published reports of student performance on the DSTP have documented gaps between the students of various racial groups (Banicky, 2001). To examine this discrepancy in a way consistent with the other analyses in this report, we chose to begin with an examination of the relationship between race and performance on the spring 2002 administration of the DSTP. The likelihood ratio test statistic (G^2) was calculated separately for each grade level within each content area. Each of these analyses involved a 4 (race: African American, Asian, Hispanic, Caucasian)¹ by 5 (performance level: well below, below, meets, exceeds, distinguished) multi-way contingency table. The results, presented in Table 1, indicated that at each grade level and in each of the three content areas there was a statistically significant relationship between race and performance.

Table 1. Likelihood Ratio Test Statistic Examining Race and DSTP Performance

Content Area	Grade	G^2
Reading	3	1091.81*
	5	985.41*
	8	916.55*
	10	929.77*
Mathematics	3	1269.04*
	5	1460.98*
	8	1520.85*
	10	1411.06*
Writing	3	406.22*
	5	471.34*
	8	599.08*
	10	465.93*

* Significant at $p < .05$

Planned comparisons examined the DSTP scores of what we labeled “historically-high performing,” i.e., Asian and Caucasian students, with “historically-low performing,” i.e., African American and Hispanic students. These analyses were conducted by collapsing the

¹ American Indians were excluded from the current and subsequent analyses because of the small number of observed frequencies across the various cells in the multi-way contingency tables.

full 4 X 5 tables in the previous analysis into 2 (race: Asians + Caucasians vs. Hispanics + African Americans) X 2 (performance: above vs. below the standard) tables. Then the likelihood ratio test statistic and the odds ratio for each table were calculated. The likelihood test statistic and odds ratios associated with these analyses are presented in Table 2.

Table 2. Planned Comparisons: DSTP Performance of Historically High vs. Historically Low Performing Students

Content Area	Grade	G ²	Odds Ratio
Reading	3	571.29*	3.71
	5	616.82*	3.82
	8	665*	3.46
	10	744.88*	3.92
Mathematics	3	813.50*	3.98
	5	1005.16*	4.49
	8	1041.44*	4.51
	10	1010.32*	5.45
Writing	3	333.11*	2.25
	5	351.09*	2.31
	8	426.10*	2.66
	10	326.33*	2.40

* Significant at $p < .05$

Key Findings (see Appendix C: Table 2)

- Historically-high performing students (i.e., Asians and Caucasians) were more likely to score above the standards as compared to historically-low performing students (i.e., Hispanics and African Americans).
- An odds ratio of 3.71 associated with the third grade reading results means that the odds of 3rd grade students meeting or exceeding the DSTP reading standard were 3.71 times greater for Asian and Caucasian students than for Hispanic and African American students.
- It may be important to note the size of the odds ratios for mathematics as compared to the other content areas.
- The size of the odds appears to increase from grade 3 up through grade 10.

These findings validate other state data that show discrepancies among student groups, content areas, and grade levels. To make these analyses clearer, we provide a descriptive breakout of the data. The tables below are organized by grade level. They are provided to further clarify the odds ratios. They include the percentage of students within both groups who scored above and below the standards in each of the three content areas.

GRADE 3		Reading		Mathematics	
	<i>Above</i>	<i>Below</i>		<i>Above</i>	<i>Below</i>
Asian &Caucasian	87.7% (n=4464)	12.3% (n=627)		82.6% (n=4397)	17.4% (n=925)
African-American & Hispanic	65.7% (n=2163)	34.3% (n=1128)		54.4% (n=1901)	45.6% (n=1592)
GRADE 5		Reading		Mathematics	
	<i>Above</i>	<i>Below</i>		<i>Above</i>	<i>Below</i>
Asian &Caucasian	86.8% (n=4393)	13.2% (n=670)		79.7% (n=4146)	20.3% (n=1056)
African-American & Hispanic	63.2% (n=2023)	36.8% (n=1180)		46.7% (n=1586)	53.3% (n=1812)
GRADE 8		Reading		Mathematics	
	<i>Above</i>	<i>Below</i>		<i>Above</i>	<i>Below</i>
Asian &Caucasian	79.7% (n=4620)	20.3% (n=1174)		59.4% (n=3470)	40.6% (n=2371)
African-American & Hispanic	53.2% (n=1645)	46.8% (n=1447)		24.5% (n=777)	75.5% (n=2392)
GRADE 10		Reading		Mathematics	
	<i>Above</i>	<i>Below</i>		<i>Above</i>	<i>Below</i>
Asian &Caucasian	75.9% (n=4081)	24.1% (n=1298)		54.2% (n=2931)	45.8% (n=2472)
African-American & Hispanic	44.5% (n=1145)	55.5% (n=1429)		17.9% (n=460)	82.1% (n=2113)

It is apparent from these data that discrepancies in students' level of performance, particularly in mathematics, become increasingly more problematic as students progress through the educational system.

Consequently, the remainder of this report is designed to examine some factors, as reported by students on the Delaware Student Testing Program survey, which may shed further light on what may be contributing to these discrepancies. However, it is important to recognize that none of the following analyses should be interpreted as causal. That is, just because a high odds ratio exists, say between students' access to computers at home and their performance on the DSTP, that does not mean that the computer access is causing the higher achievement. It only implies that students with access to a home computer are more likely to a certain degree (odds) to have met or exceeded the standard on some portion of the state test.

NOTE: The same analytic procedures were conducted for this and all subsequent comparisons that appear in this report. To improve readability, the tables with results of the statistical analyses are included in Appendix C and are organized by topic. Throughout this report, when odds ratios appear to be particularly high (in the authors' opinion, i.e., 3.0 or higher) descriptive data will be presented.

EFFORT AND DSTP PERFORMANCE

While students' effort, per se, is not specifically a system-level "opportunity to learn" issue, it is one that is viewed as important by policymakers and educators. Many believe that without sanctions, students are unlikely to take the DSTP seriously and this will negatively affect their performance. Therefore, we chose to examine this student-level factor, that is, students' expressed level of effort, in relation to their performance on the DSTP.

We explored this relationship by comparing students' responses to survey items that asked how hard they tried on the reading, writing, and mathematics tests with their performance level on related portions of the DSTP. More specifically students were provided with the following question in relation to each section of the DSTP:

- How hard did you try to do your best on the DSTP reading (math, writing) test?
- a. Very Hard
 - b. Somewhat
 - c. Not very hard

The likelihood ratio test statistic (G^2) was calculated separately for each grade level within each content area. The results (Appendix C: Table 3) indicated that at each grade level and in each of the three content areas there was a significant relationship between effort and performance.

Key Findings (see Appendix C: Table 4)

- Students indicating that they tried “very hard” or “somewhat hard” were more likely to score above the standard than students who reported not trying very hard.
- The odds of meeting or exceeding the reading portion of the test were 3.41 times greater for students who indicated that they tried very or somewhat hard on the DSTP reading test relative to those students indicating that they did not try very hard.
- It appears that the odds ratios consistently decline between grade 3 and grade 10 in both reading and mathematics. They range from 3.41 in grade 3 reading and decline to 1.75 in 10th grade reading; mathematics ratios decline from 3.18 in grade 3 to 1.90 in grade 10.
- Odds ratios in writing remain above 3.0 across all four tested grades, peaking as high as 4.64 in grade 5.
- At each grade level, very few students, regardless of their level of DSTP performance, indicated that they did not try very hard on any of the subtests. One could conclude from this lack of variability that the survey items themselves lack the sensitivity needed to adequately ascertain students’ true level of effort.

Again, since odds ratios in some areas exceed 3.0, we present descriptive summaries to better clarify the implications of these ratios.

GRADE 3	Reading		Math		Writing	
	<i>Above</i>	<i>Below</i>	<i>Above</i>	<i>Below</i>	<i>Above</i>	<i>Below</i>
Trying “very hard” or “somewhat”	80% n=6248	20% n= 1562	72.6% n=5930	27.4% n=2233	46.1% n=3783	53.9% n=4427
Trying “not very hard”	54% n= 129	46% n= 110	45.5% n= 111	54.5% n=133	19.9% n= 52	80.1% n=209

GRADE 5	Writing	
	<i>Above</i>	<i>Below</i>
Trying “very hard” or “somewhat”	49.6% n=3973	50.4% n= 4044
Trying “not very hard”	17.5% n= 22	82.5% n= 104

GRADE 8 Writing		
	<i>Above</i>	<i>Below</i>
Trying “very hard” or “somewhat”	71.8% n= 6125	28.3% n= 2408
Trying “not very hard”	39% n= 48	61% n= 75

GRADE 10 Writing		
	<i>Above</i>	<i>Below</i>
Trying “very hard” or “somewhat”	50.7% n= 3774	49.3% n=3674
Trying “not very hard”	24.7% n=71	75.3% n= 217

EFFORT AND RACE

To gain a better understanding of the role that effort plays, in particular as it varies across student groups, we explored the relationship of effort and race. The same analyses were conducted in all three content areas across the four tested grade levels. The results (Appendix C: Table 5) indicated that effort differences among students of various races occurred in the areas of reading, writing, and mathematics in 3rd grade and in the area of writing in 10th grade. Consequently, follow-up analyses were only conducted in these areas.

Key Findings (see Appendix C: Table 6)

- Historically high performing students (Asians & Caucasians) were more likely to indicate that they tried very hard or somewhat hard on portions of the DSTP compared to historically low performing students (African-Americans and Hispanics).
- The 2 X 2 comparison examining effort and race in the area of writing at the 10th grade level was not statistically significant indicating that the differences reported in Table 5 are not captured by the pre-determined comparisons used in the current study.
- Furthermore, an examination of the odds ratios revealed that the reading result may be statistically significant but the odds ratio (1.60) and all odds ratios less than 2 are *not substantively meaningful* (in the authors’ opinion).
- With the exception of third grade students, the analyses revealed that racial status is *unrelated* to the amount of effort a student reported applying in each

of the content areas assessed by the DSTP. Also, this third grade finding should be interpreted cautiously considering the low percentage of students who actually responded to the effort item that they did not try very hard.

PREPAREDNESS AND DSTP PERFORMANCE

The relationship between students' perceptions of how well prepared they are and their performance on the DSTP was examined by comparing students' responses to the item listed below with the performance level they achieved on the mathematics portion of the DSTP. More specifically students were asked the following question:

Do you feel your mathematics class has prepared you to do your best on the mathematics assessment?

- a. Yes
- b. Somewhat
- c. Not sure
- d. No

This analysis is limited to mathematics since this question was only asked in reference to that content area. Students responding "not sure" were excluded from the current analysis resulting in a test of a 3 (prepared: yes, somewhat, no) by 5 (performance level) multi-way contingency table. The results (Appendix C: Table 7) indicate that at each grade level there was a statistically significant relationship between how well students felt their math class prepared them for the mathematics portion of the DSTP and how well they performed.

Key Findings (see Appendix C: Table 8)

- Students indicating that their math class prepared them for the DSTP (by responding 'yes' or 'somewhat') were more likely to score above the standard in math.
- Odds ratios ranged from 2.02 at grade 8 (lowest) to 2.96 (highest) at grade 3. An odds ratio of 2.96 means that the odds of meeting or exceeding the math standard were 2.96 times greater for students who felt that their math class prepared them for the DSTP as compared to those students who felt as though their math class did not prepare them for the DSTP.

PREPAREDNESS AND RACE

The relationship between race and student perceptions of preparedness was examined and statistically significant relationships were found in each of the grades assessed (Appendix C: Table 9). Planned comparisons examining the self-reported feelings of preparedness of historically-high and historically-low performing students were conducted.

Key Findings (see Appendix C: Table 10)

- The results revealed that Caucasian and Asian 3rd and 5th grade students were more likely to indicate that their math class prepared them for the DSTP than did Hispanic and African American students.
- The 2 X 2 comparison of race and perceptions of preparedness in the area of mathematics at the 8th and 10th grade level was not statistically significant indicating that the differences reported in Table 9 are not captured by the pre-determined comparisons used in the current study.
- For both 3rd grade and 5th grade students, the odds of feeling prepared for the mathematics portion of the DSTP were 1.96 times greater for historically high performing students than historically low performing students.

HOME COMPUTER ACCESS AND DSTP PERFORMANCE

The relationship between home computer access and performance on the DSTP was examined by comparing students' responses to the item listed below with their performance level on the various portions of the DSTP. More specifically, students were asked the following question:

Do you have a computer at home that you can use?

- a. Yes
- b. No

The likelihood ratio test statistic (G^2) calculation (Appendix C; Table 11) indicates that at each grade level and in each of the three content areas there is a significant relationship between home computer access and DSTP performance.

Key Findings (see Appendix C: Table 12)

- 8th and 10th grade students with access to a computer at home were about 3 to 3 and one-half times more likely to meet or exceed the standard in reading.
- 8th and 10th grade students with access to a computer at home were 3 to 4 and one-half times more likely to meet or exceed the standard in mathematics.

To make this analysis somewhat clearer, we provide a descriptive breakout of these findings. The tables below are organized by grade level. It only includes analyses that yielded odds ratios of 3.0 or higher. The tables are provided to further clarify the odds ratios found in Table 12. They include the percentage of students within both groups who scored above and below the standards in the reading and mathematics content areas.

GRADE 8	Reading		Mathematics	
	<i>Above</i>	<i>Below</i>	<i>Above</i>	<i>Below</i>
With Access to Home Computer	74.7% (n=5472)	25.3% (n=1851)	51.7% (n=3834)	48.3% (n=3578)
Without Access to Home Computer	49% (n=569)	51% (n=592)	22.3% (n=270)	77.7% (n=939)

GRADE 10	Reading		Mathematics	
	<i>Above</i>	<i>Below</i>	<i>Above</i>	<i>Below</i>
With Access to Home Computer	70.9% (n=4715)	29.1% (n=1939)	47.2% (n=3166)	52.8% (n=3546)
Without Access to Home Computer	40% (n=400)	60% (n=600)	16.7% (n=170)	83.3% (n=850)

HOME COMPUTER ACCESS AND RACE

The relationship between racial status and access to a computer at home was examined separately for students from low-income families and non-low income families within each grade level (Appendix C: Table 13).

Key Findings (see Appendix C: Table 14)

- Regardless of family income status, Asian and Caucasian students were more likely to indicate that they had access to a computer at home.
- 8th and 10th grade Asian and Caucasian students from non-low income families were about 3 to 3 and one-half times more likely to report having access to a computer in their homes as compared to their African-American and Hispanic classmates from families of similar income status.

PARENTAL SUPPORT AND DSTP PERFORMANCE

The relationship between parental support and their performance on the DSTP was examined by comparing students' responses to the items listed below with the performance level they achieved on the various portions of the DSTP. Students were asked:

Do your parents (or your guardian) encourage you to do your best in school?

- a. Yes
- b. Somewhat
- c. No

How often do you talk about what you have learned in school with someone at home?

- a. Every day
- b. Once a week
- c. Once a month
- d. Never

The results (Appendix C: Table 15) indicate that at each grade level and in each of the three content areas there was a significant relationship between these measures of parental support and DSTP performance.

Key Findings (see Appendix C: Table 16)

- Students reporting at least some parental support (i.e., responses of ‘yes’ or ‘somewhat’) were, on average, 2 to 3 times more likely to meet the standards in reading, writing, and mathematics as compared to students indicating that their parents do not encourage them to do well.
- However, for 8th grade students in the area of mathematics and 10th grade students in the area of writing, the pre-determined comparisons were not statistically significant.
- Although the planned comparisons associated with the discussion frequency item were statistically significant at each grade level and in each content area, the odds ratios associated with the effects were relatively small indicating that although the result *may be statistically significant it may not be substantively meaningful*.

PARENTAL SUPPORT AND RACE

The relationship between parental support and race was examined in a manner similar to the discussion under the previous section. The results (Appendix C: Table 17) indicated that a significant relationship existed between race and levels of parental support at all levels except grade 3.

Key Findings (see Appendix C: Table 18)

- Although some of the planned comparisons did reach statistical significance, the odds ratios associated with the comparisons *were not substantively meaningful*.
- There is no *meaningful* difference between the parental support reported by Asian and Caucasian students as compared to Hispanic and African American students.

CONTENT SPECIFIC ACTIVITIES AND DSTP PERFORMANCE

Reading

FREQUENCY OF READING AT HOME AND DSTP PERFORMANCE

The relationship between how often a student reads at home and his/her performance on the DSTP was examined by comparing students' responses to the item listed below with the performance level they achieved on the reading portion of the DSTP. Students were asked:

- How often do you read at home?
- a. Almost every day
 - b. Once or twice a week
 - c. Once or twice a month
 - d. Never or hardly ever

At each grade level there was a statistically significant relationship between how often students read at home and how well they did on the reading portion of the DSTP (see Appendix C: Table 19).

Key Finding (see Appendix C: Table 20)

- Students indicating that they frequently read at home (i.e., almost every day OR once or twice a week) were more likely to score above the standard in reading. However, the odds ratios associated with each of these analyses were relatively small ranging from 1.43 to 1.90.

FREQUENCY OF READING AT HOME AND RACE

The likelihood ratio test statistic (G^2) was calculated separately for each grade level and examined the relationship between race and frequency of reading at home; a statistically significant relationship existed between race and home reading frequency in each of the grades assessed (see Appendix C: Table 21).

Key Finding (see Appendix C: Table 22)

- The odds ratios associated with these comparisons were relatively small indicating *a statistical but not meaningful* association between these two variables. Odds ratios ranged from 1.28 to 1.34, meaning that Asian and Caucasian students were only 1.28 to 1.34 more likely to report reading frequently at home as compared to African-American and Hispanic students.

Mathematics

FREQUENCY OF CALCULATOR USE AND DSTP PERFORMANCE

The relationship between frequency of calculator use and students' performance on the DSTP was examined by comparing students' responses to the item listed below with the performance level they achieved on the mathematics portion of the DSTP.

How often do you use a (*graphing*) calculator in your mathematics class?

- a. Every day
- b. Once or twice a week
- c. Once or twice a month
- d. Never

The results (Appendix C: Table 23) indicate that at each grade level there was a statistically significant relationship between the frequency of calculator use and how well the student performed on the mathematics portion of the DSTP.

Key Findings (see Appendix C: Table 24)

- In the early grades (i.e., grades 3 and 5), students using a calculator *infrequently* (once or twice a month or never) are more likely to meet or exceed that mathematics standard.
- However, the opposite appears true for 10th graders. The results indicated that 10th grade students who reported using a graphing calculator frequently were more likely to meet or exceed the DSTP math standard. More specifically, the odds of meeting or exceeding the math standard in 10th grade were 2 times greater for students indicating that they used a graphing calculator frequently (i.e. every day & once or twice a week) in their math class.

FREQUENCY OF CALCULATOR USE AND RACE

The relationship between frequency of calculator use and race was examined by calculating the likelihood ratio test statistic separately for each grade level. The results (Appendix C: Table 25) indicate that a significant relationship existed between race and frequency of calculator use.

Key Finding (see Appendix C: Table 26)

- Although the follow-up analyses comparing historically-high and historically-low performing students were statistically significant, the odds ratios associated with the relationships were relatively small, ranging from 1.25 to 1.85.

Writing

FREQUENCY OF WRITING LESSONS AND DSTP PERFORMANCE

The relationship between how often students receive writing lessons in class and their performance on the DSTP was examined by comparing students' responses to the item listed below with the performance level they achieved on the writing portion of the DSTP.

How often does your teacher give lessons about how to be a good writer?

- a. Every day
- b. Once or twice a week
- c. Once or twice a month
- d. Never or hardly ever

The results (Appendix C: Table 27) indicate that at each grade level there was a statistically significant relationship between the frequency of writing lessons and how well the student performed on the writing portion of the DSTP.

Key Finding (see Appendix C: Table 28)

- Although the relationship between writing lesson frequency and DSTP performance was statistically significant, the pre-determined comparisons were not substantively meaningful with odds ratios ranging from 1.26 to 1.67.

FREQUENCY OF WRITING LESSONS AND RACE

The likelihood ratio test statistic (G^2) was calculated separately for each grade level and examined the relationship between race and students' perceptions of preparedness. The results (Appendix C: Table 29) indicate that a significant relationship existed between race and the reported frequency of writing lessons.

Key Finding (see Appendix C: Table 30)

- There were *no meaningful relationships between writing lesson frequency and race* as represented in the pre-determined comparisons used in the current analysis.

RECOMMENDATIONS

OPPORTUNITY TO LEARN AS A RESEARCH CONCEPT

Each of Delaware’s Curriculum Frameworks’ documents² speaks to the states’ commitment to opportunity to learn.

The English Language Arts Curriculum Framework document defines “Equity (as) fairness; *a matter of equal opportunity*; providing for each student the opportunity he or she needs to succeed educationally. For example, tests and assessments should not systematically penalize an individual because of gender, race, or cultural background. Likewise, differences in educational programs to address individual student needs should not systematically offer some students less rich educational experiences.” (author’s emphasis)

The Social Studies Curriculum Framework addresses “A Commitment to Our Children ...Delaware's adoption of this curriculum framework will have decided implications for our children, our schools, and our state...Students *must be provided with the materials with which to learn*, and teachers the materials with which to teach.” (author’s emphasis)

“The Delaware Mathematics Framework Commission is committed to ensuring that *all students have an opportunity* to develop the ability and confidence to reason and communicate mathematically (author’s emphasis)

“Basis for K-12 Science... The primary intent is to encourage study and participation by *all students* and the building of capacity for life-long learning.” (author’s emphasis)

The commissions that drafted the state’s curriculum frameworks emphasized equal learning opportunity for all students. The issue of providing equitable schooling to all students becomes even more significant in the current environment of high-stakes accountability. When all students are held to the same high standards, all students should be ensured the same quality of instruction.

² Source: Delaware Department of Education website, Curriculum Framework documents for English Language Arts, Social Studies, Mathematics, and Science

The OTL concept was originally explored over 35 years ago to ensure the validity of cross-national comparisons by the International Association for the Evaluation of Educational Achievement (McDonnell, 1995). These researchers recognized that when comparisons were made of students' mathematics achievement across countries, curricular differences needed to be taken into account. Later, when standards became the focus of U.S. education reform, there were numerous discussions about the need for OTL standards as well. National assessments, including the Second International Mathematics Study (SIMS), the National Assessment of Education Progress (NAEP), and the Third International Mathematics & Science Assessment (TIMSS) have incorporated measures of OTL. Indicator systems (Guiton & Oakes, 1995) designed to measure OTL typically need to include an examination of a range of process variables that provide data on the following:

- teacher qualifications & experience
- financial expenditures
- course offerings & student course taking patterns
- curriculum content
- instructional strategies
- school organization and resources

However, while research indicates that OTL is a critical issue, it is often difficult to measure. Part of the difficulty arises because of the complexity of the learning process and the number of factors related to learning. In addition, most strategies for collecting OTL information (teacher self-reports, classroom observations, administrator appraisals, fiscal analyses, etc.) are time consuming and costly.

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APPENDIX A

~ DSTP STUDENT SURVEY ~

Directions: Read each question carefully. Choose the best answer for each question. Then circle the question number on the questionnaire.

1. How often do you talk about what you have learned in school with someone at home?

- a. Every day
- b. Once a week
- c. Once a month
- d. Never

2. Do your parents (or your guardian) encourage you to do your best in school?

- a. Yes
- b. Sometimes
- c. No

3. How much time do you spend on your homework each day?

- a. One hour or more
- b. A half hour
- c. I don't have homework.
- d. I don't do my homework.

4. How much television do you watch each weekday?

- a. Two hours or more
- b. About an hour
- c. About a half hour
- d. None

5. Do you have a computer at home that you can use?

- a. Yes
- b. No

If you answered 'No' to question 5, you may skip question 6. If you answered 'Yes' to question 5, please answer the next question:

6. How often do you use the computer at home for learning?

- a. Almost every day
- b. Once or twice a week
- c. Once or twice a month
- d. Never

7. Does your school have computers that you can use?

- a. Yes
- b. No

If you answered 'No' to question 7, you may skip question 8. If you answered 'Yes' to question 7, please answer the next question:

8. How often do you use the computer in school for learning?

- a. Every day
- b. Once or twice a week
- c. Once or twice a month
- d. Never

9. How important is it to you to do well in school?

- a. Very important
- b. Somewhat important
- c. Not sure
- d. Not important

10. How often do you read to yourself in school? (Grades 3 and 5 Survey Only)

- a. Every day
- b. Every other day
- c. Once or twice a week
- d. Never

How much time do you usually spend reading in preparation for your English class each day? (Grades 8 and 10 only)

- a. One hour or more*
- b. About 30 minutes*
- c. About 15 minutes*
- d. None*

11. How often does your teacher read a chapter or a picture book to you in school? (Grades 3 and 5 Survey Only)

- a. Every day
- b. Every other day
- c. Once or twice a week
- d. Never

12. How often do you read at home?

- a. Every day
- b. Every other day
- c. Once or twice a week
- d. Never

13. How often does your teacher ask you to talk with other students about what you have read?

- a. Every day
- b. Every other day
- c. Once or twice a week
- d. Never

14. *How often does your teacher ask you to write about what you have read in your English class? (Grades 8 and 10 only)*

- a. *Almost every day*
- b. *Once or twice a week*
- c. *Once or twice a month*
- d. *Never or hardly ever*

15. How hard did you try to do your best on the DSTP reading assessment?

- a. Very hard
- b. Somewhat
- c. Not hard

16. How often does your teacher give lessons about how to be a good writer?

- a. Every day
- b. Once or twice a week
- c. Once or twice a month
- d. Never

How often do you have writing homework? (Grades 8 and 10 only)

- a. *Almost every day*
- b. *Once or twice a week*
- c. *Once or twice a month*
- d. *Never or hardly ever*

17. How often do you plan, draft, and revise your writing?

- a. Always
- b. Sometimes
- c. Only if it is asked
- d. Never

18. How hard did you try to do your best on the DSTP writing assessment?

- a. Very hard
- b. Somewhat
- c. Not very hard

19. How often do you have mathematics homework?

- a. Every day
- b. Once or twice a week
- c. Once or twice a month
- d. Never

20. How often do you use a calculator in your mathematics class?

- a. Every day
- b. Once or twice a week
- c. Once or twice a month
- d. Never

21. When do you use a calculator in your mathematics class? (Grades 3 and 5)

When do you usually use a graphing calculator in your mathematics class? (Grades 8 and 10)

- a. Only when my teacher allows me to use it.
- b. Any time I want to use it.
- c. I only use it to check my answers.
- d. I never use it.

22. When you receive a mathematics assignment, what does your teacher usually do?

- a. Show you how to solve the problems
- b. Ask you to work by yourself to solve the problems
- c. Ask you to work by yourself to solve the problems and then discuss the solutions with the whole class.

When you receive a mathematics assignment, does your teacher usually encourage you to try different approaches to solve the problems? (Grades 8 and 10 Only)

- a. Yes
- b. Sometimes
- c. Never or hardly ever

23. Do you feel your mathematics class has prepared you to do your best on the DSTP mathematics assessment?

- a. Yes
- b. Somewhat
- c. Not sure
- d. No

24. How hard did you try to do your best on the DSTP mathematics assessment?

- a. Very hard
- b. Somewhat
- c. Not very hard

APPENDIX B

Planned comparisons (i.e. how the larger multi-way contingency tables were collapsed) for follow-up analyses were predetermined in the following manner:

- a. **Race:** Historically high performing (i.e. Asians and Caucasians) vs. historically low performing (i.e. African Americans and Hispanics)
- b. **Effort:** at least somewhat (i.e. very hard and somewhat) vs. not very hard
- c. **Performance:** above the standard (i.e. performance levels 3-5) vs. below the standard (i.e. performance levels 1-2)
- d. **Preparedness:** at least somewhat (i.e. yes and somewhat) vs. no
- e. **Parental encouragement:** at least somewhat (i.e. yes and somewhat) vs. no
- f. **Frequency of discussions about learning:** frequently (i.e. every day and once a week) vs. infrequently (i.e. once a month and never)
- g. **Home reading:** frequently (i.e. almost every day and once or twice a week) vs. infrequently (i.e. once or twice a month and never or hardly ever)
- h. **Frequency of calculator use:** frequently (i.e. every day and once or twice a week) vs. infrequently (once or twice a month and never)
- i. **Frequency of writing lessons:** frequently (i.e. every day and once or twice a week) vs. infrequently (i.e. once or twice a month, never or hardly ever)

APPENDIX C**DSTP PERFORMANCE AND RACE****Table 1. Likelihood Ratio Test Statistic Examining Race and DSTP Performance**

Content Area	Grade	G ²
Reading	3	1091.81*
	5	985.41*
	8	916.55*
	10	929.77*
Mathematics	3	1269.04*
	5	1460.98*
	8	1520.85*
	10	1411.06*
Writing	3	406.22*
	5	471.34*
	8	599.08*
	10	465.93*

* Significant at p<.05

Table 2. Planned Comparisons: DSTP Performance of Historically High vs. Historically Low Performing Students

Content Area	Grade	G ²	Odds Ratio
Reading	3	571.29*	3.71
	5	616.82*	3.82
	8	665*	3.46
	10	744.88*	3.92
Mathematics	3	813.50*	3.98
	5	1005.16*	4.49
	8	1041.44*	4.51
	10	1010.32*	5.45
Writing	3	333.11*	2.25
	5	351.09*	2.31
	8	426.10*	2.66
	10	326.33*	2.40

* Significant at p<.05

EFFORT AND PERFORMANCE

Table 3. Likelihood Ratio Test Statistic Examining Effort and DSTP Performance

Content Area	Grade	G ²
Reading	3	150.22*
	5	67.92*
	8	41.81*
	10	49.77*
Mathematics	3	136.94*
	5	58.04*
	8	67.95*
	10	133.74*
Writing	3	128.83*
	5	142.20*
	8	157.85*
	10	184.89*

Significant at p<.05

Table 4. Planned Comparisons: DSTP Performance of Students Trying at Least Somewhat vs. Students Not Trying Hard

Content Area	Grade	G ²	Odds Ratio
Reading	3	78.86*	3.41
	5	24.73*	2.83
	8	13.36*	1.82
	10	21.60*	1.75
Mathematics	3	76.87*	3.18
	5	28.47*	2.62
	8	2.68	----
	10	39.24*	1.90
Writing	3	75.88*	3.43
	5	55.72*	4.64
	8	56.14*	3.97
	10	78.63*	3.14

- Significant at p<.05

EFFORT AND RACE

Table 5. Likelihood Ratio Test Statistic Examining Effort and Race

Content Area	Grade	G ²
Reading	3	19.80*
	5	4.06
	8	5.60
	10	10.92
Mathematics	3	35.10*
	5	10.64
	8	3.45
	10	11.82
Writing	3	56.85*
	5	10.11
	8	11.89
	10	31.04*

*Significant at p<.05

Table 6. Planned Comparisons: Amount of Effort Applied by Historically High Performing vs. Historically Low Performing Students

Grade	Content Area	G ²	Odds Ratio
3	Reading	12.66*	1.60
	Writing	50.54*	2.47
	Mathematics	27.79*	1.99
10	Writing	3.47	----

* Significant at p<.05

PREPAREDNESS AND PERFORMANCE**Table 7. Likelihood Ratio Test Statistic Examining Preparedness and DSTP Math Performance**

Content Area	Grade	G ²
Mathematics	3	72.40*
	5	68.55*
	8	295.25*
	10	574.34*

* Significant at p<.05

Table 8. Planned Comparisons: DSTP Performance of Self-Reported Prepared vs. Unprepared Students

Content Area	Grade	G ²	Odds Ratio
Mathematics	3	35.34*	2.96
	5	31.98*	2.51
	8	83.32*	2.02
	10	242.03*	2.53

Significant at p<.05

PREPAREDNESS AND RACE

Table 9. Likelihood Ratio Test Statistic Examining Race and Preparedness

Content Area	Grade	G ²
Mathematics Preparation	3	26.27*
	5	33.67*
	8	17.14*
	10	35.72*

* Significant at p<.05

Table 10. Planned Comparisons: Self-reported Preparedness of Historically High vs. Historically Low Performing Students

Grade	G ²	Odds Ratio
3	13.95*	1.96
5	17.34*	1.96
8	3.52	----
10	8.98	----

- Significant at p<.05

HOME COMPUTER ACCESS AND DSTP PERFORMANCE

Table 11. Likelihood Ratio Test Statistic Examining Home Computer Access and DSTP Performance

Content Area	Grade	G ²
Reading	3	248.48*
	5	327.97*
	8	356.24*
	10	417.42*
Mathematics	3	256.97*
	5	401.93*
	8	482.87*
	10	513.93*
Writing	3	120.21*
	5	226.88*
	8	314.96*
	10	313.23*

*Significant at p<.05

Table 12. Planned Comparisons: DSTP Performance of Students with Access to a Computer at Home vs. Students without Access

Content Area	Grade	G ²	Odds Ratio
Reading	3	118.91*	2.05
	5	202.16*	2.60
	8	296.86*	3.08
	10	350.45*	3.65
Mathematics	3	157.72*	2.08
	5	262.22*	2.64
	8	380.92*	3.73
	10	370.62*	4.46
Writing	3	79.97*	1.66
	5	97.65*	1.84
	8	259.64*	2.81
	10	238.67*	2.98

*Significant at p<.05

HOME COMPUTER ACCESS AND RACE

Table 13. Likelihood Ratio Test Statistic Examining Race and Home Computer Access Among Low Income and Non-low income students

Family Income Status	Grade	G ²
Low Income	3	40.86*
	5	38.88*
	8	59.86*
	10	52.54*
Non-low Income	3	96.02*
	5	96.87*
	8	115.54*
	10	195.73*

*Significant at p<.05

Table 14. Planned Comparisons: Home Computer Access Among Historically High and Historically Low Performing Students

Family Income Status	Grade	G ²	Odds Ratio
Low Income	3	21.65*	1.45
	5	25.16*	1.54
	8	46.24*	1.84
	10	49.85*	2.30
Non-low Income	3	95.10*	2.53
	5	93.78*	2.75
	8	104.57*	3.03
	10	189.06*	3.68

* Significant at p<.05

PARENTAL SUPPORT AND DSTP PERFORMANCE**Table 15. Likelihood Ratio Test Statistic Examining Parental Support
and DSTP Performance**

Parental Support Item	Content Area	Grade	G ²
Parental Encouragement	Reading	3	51.91*
		5	76.83*
		8	56.22*
		10	60.41*
	Mathematics	3	56.40*
		5	52.80*
		8	61.10*
		10	60.27*
	Writing	3	63.01*
		5	69.15*
		8	77.03*
		10	54.74*
Discussion Frequency	Reading	3	72.14*
		5	158.48*
		8	134.21*
		10	161.15*
	Mathematics	3	82.02*
		5	139.57*
		8	125.32*
		10	109.41*
	Writing	3	101.56*
		5	147.55*
		8	142.93*
		10	174.32*

* Significant at p<.05

PARENTAL SUPPORT AND DSTP PERFORMANCE (CONTINUED)**Table 16. Likelihood Ratio Test Statistics for the 2 X 2 Analyses**

Parental Support Item	Content Area	Grade	G ²	Odds Ratio
Parental Encouragement	Reading	3	23.51*	2.87
		5	16.95*	3.18
		8	24.60*	3.34
		10	19.94*	2.20
	Mathematics	3	25.84*	2.68
		5	10.71*	2.32
		8	6.57	----
		10	10.89*	1.84
	Writing	3	9.53*	1.89
		5	15.39*	2.97
		8	21.68*	3.03
		10	6.61	----
Discussion Frequency	Reading	3	18.73*	1.36
		5	70.78*	3.18
		8	32.53*	1.38
		10	90.87*	1.66
	Mathematics	3	20.82*	1.33
		5	45.47*	1.50
		8	36.54*	1.37
		10	60.67*	1.49
	Writing	3	63.18*	1.61
		5	96.97*	1.79
		8	69.11*	1.59
		10	117.78*	1.74

*Significant at p<.05

PARENTAL SUPPORT AND RACE**Table 17. Likelihood Ratio Test Statistic Examining Race and Parental Support**

Content Area	Grade	G ²
Parental Encouragement	3	7.27
	5	23.07*
	8	13.88*
	10	19.66*
Discussion Frequency	3	18.73*
	5	47.78*
	8	37.51*
	10	79.50*

* Significant at p<.05

Table 18. Planned Comparisons: Parental Support Reported by Historically High vs. Historically Low Performing Students

Parental Support Item	Grade	G ²	Odds Ratio
Parental Encouragement	5	.20	----
	8	2.85	----
	10	9.05*	1.70
Discussion Frequency	3	5.52	----
	5	29.43*	1.37
	8	13.66*	1.22
	10	58.18*	1.50

* Significant at p<.05

CONTENT SPECIFIC ACTIVITIES AND DSTP PERFORMANCE

FREQUENCY OF READING AT HOME AND DSTP PERFORMANCE

Table 19. Likelihood Ratio Test Statistic Examining Frequency of Reading at Home and DSTP Performance

Content Area	Grade	G ²
Reading	3	236.15*
	5	484.06*
	8	331.36*
	10	273.55*

* Significant at p<.05

Table 20. Likelihood Ratio Test Statistics for the 2 X 2 Analyses

Content Area	Grade	G ²	Odds Ratio
Reading	3	33.20*	1.43
	5	134.66*	1.90
	8	154.61*	1.84
	10	113.96*	1.69

* Significant at p<.05

FREQUENCY OF READING AT HOME AND RACE

Table 21. Likelihood Ratio Test Statistic Examining Race and Frequency of Reading at Home

Content Area	Grade	G ²
Frequency of Reading at Home	3	116.11*
	5	173.78*
	8	86.33*
	10	38.16*

* Significant at p<.05

Table 22. Planned Comparisons: Frequency of Reading at Home Reported by Historically High vs. Historically Low Performing Students

Grade	G ²	Odds Ratio
3	22.77*	1.28
5	55.31*	1.41
8	39.84*	1.34
10	.036	----

* Significant at p<.05

FREQUENCY OF CALCULATOR USE AND DSTP PERFORMANCE

Table 23. Likelihood Ratio Test Statistic Examining Frequency of Calculator Use and DSTP Performance

Content Item	Grade	G ²
Frequency of Calculator Use	3	776.87*
	5	297.96*
	8	73.88*
	10	373.48*

*Significant at p<.05

Table 24. Planned Comparisons: DSTP Performance of Frequent vs. Infrequent Calculator Users

Content Item	Grade	G ²	Odds Ratio
Frequency of Calculator Use	3	107.42*	1.74 ^a
	5	96.36*	1.65 ^a
	8	8.07	----
	10	167.73*	2.04

*Significant at p<.05 ^a In both of these cases the odds of meeting or exceeding the mathematics standard were higher for students reporting that they used a calculator infrequently.

FREQUENCY OF CALCULATOR USE AND RACE**Table 25. Likelihood Ratio Test Statistic Examining Race and Frequency of Calculator Use**

Item	Grade	G ²
Frequency of Calculator Use	3	273.51*
	5	88.16*
	8	51.00*
	10	62.95*

* Significant at p<.05

Table 26. Planned Comparisons: Frequency of Calculator Use among Historically High vs. Historically Low Performing Students

Grade	G ²	Odds Ratio
3	175.30*	1.85
5	26.33*	1.29
8	24.75*	1.25
10	45.54*	1.45

* Significant at p<.05

FREQUENCY OF WRITING LESSONS AND DSTP PERFORMANCE

Table 27. Likelihood Ratio Test Statistic Examining Frequency of Writing Lessons and DSTP Writing Performance

Content Area	Grade	G ²
Frequency of Writing Lessons	3	109.12*
	5	174.99*
	8	173.43*
	10	84.28*

* Significant at p<.05

Table 28. Planned Comparisons: DSTP Performance of Students Reporting Frequent Writing Lessons vs. Student Reporting Infrequent Writing Lessons

Content Area	Grade	G ²	Odds Ratio
Frequency of Writing Lessons	3	13.74*	1.26
	5	57.98*	1.54
	8	87.49*	1.67
	10	.46	----

* Significant at p<.05

FREQUENCY OF WRITING LESSONS AND RACE

Table 29. Likelihood Ratio Test Statistic Examining Race and Frequency of Writing Lessons

Content Area	Grade	G ²
Frequency of Writing Lessons	3	183.40*
	5	116.41*
	8	88.23*
	10	193.04*

* Significant at p<.05

Table 30. Planned Comparisons: Reported Writing Lesson Frequency of Historically High vs. Historically Low Performing Students

Grade	G ²	Odds Ratio
3	27.06*	1.39
5	1.76	----
8	1.76	----
10	59.73*	1.55

* Significant at p<.05

APPENDIX D

METHODOLOGICAL ISSUES

The DSTP Student Survey attempts to capture data about a wide variety of issues. It is apparent that many individuals with varied needs and interests designed and/or provided input into the development of the instrument. As a result, when we examined the instrument specifically for the purpose of exploring students' opportunity to learn, we were limited to those few items that appear in this report. Therefore, we recommend that if the state plans to continue to collect data at the student level (and we strongly suggest that it does), the purpose of the survey should be more clearly defined (and more focused) prior to the creation of survey questions. It should be clear what research question(s) or main issues the survey intends to answer; then, questions can be developed to generate information to specifically answer these questions. In addition, it may be helpful to determine whether the intent is to make descriptive assertions about students (i.e., discover the distribution of certain attributes) or to make explanatory assertions about students (i.e., explain why).

After having agreed upon a small number of key questions and issues, there are general survey design guidelines that should be followed for creating informative closed-ended items. While there are entire books and graduate level courses on the topic of creating surveys and analyzing categorical data, this discussion focuses on the components that, in our opinion, were problematic in this student survey. We hope that those involved in the development of the DSTP Student Survey will consider these questions in the next revision of the instrument.

- a. Will the student understand the question?

It is important to not only consider appropriate vocabulary, but also word usage. In addition, the question must be unambiguous, that is, all students should interpret the survey questions in the same way.

- b. Can the student recall the answer to the question?

Only four out of twenty-four survey items asked specifically about the DSTP. Therefore, if there are concerns about the current timing of this administration (at the end of the test period), with minor adjustments, the survey could be administered at another time during the school year.

- c. Are the directions clear?

Typically, respondents should be given a time frame when thinking about survey questions such as during the last school year, within the last month, or last week.

- d. Are the options exhaustive, mutually exclusive, and balanced?

Each list of options should include all possible responses. However, an item is problematic if a student could select more than one response.

For example, “how often do you plan, draft, and revise your writing?”

- a. always
- b. sometimes
- c. only if it is asked
- d. never

The item appears to ask about what could be seen by the student as 3 different writing activities. So how does the student respond if he *never* revises his writing on his own but participates in the planning process *sometimes* when the teacher asks?

Another example, “When do you use a calculator in your mathematics class?”

- a. Only when my teacher allows it.
- b. Any time I want to use it.
- c. I only use it to check my answers.
- d. I never use it.

What about the student who never uses it because the teacher doesn't allow it? These options are problematic because they are mixing teacher behaviors with student behaviors.

Also, it is important that answer options be balanced. Below is an example of an item with balanced response options.

“My mathematics class prepared me to do my best on the DSTP mathematics assessment.”

- a. strongly agree
- b. somewhat agree
- c. somewhat disagree
- d. strongly disagree

Clearly leaving out one of these four options would make the item unbalanced. For other items, the unbalanced nature of the options is not as clear. However, when there are an odd number of options, the middle option should reflect a middle point. When there are four options, two of the options should be opposites of the other two options unless the point of the item is to gather only nominal information (distinct categories with no implied order).