**Quantitative Literacy and Scientific Reasoning**

**CBASE Assessment Results**

**Spring 2015**

**General Education Goals & Outcomes**

The quantitative literacy goals and associated student learning outcomes have been aligned with the following General Education Groups:

**Quantitative Literacy Outcomes**

|  |  |  |  |
| --- | --- | --- | --- |
| **Outcomes** | | **General Education Groups** | |
| **Quantitative Literacy** | **Science** | **Quantitative Literacy** | **Science** |
| 3.1 Collect measurement data in a scientific manner | 1h.1 Use common lab equipment and procedures to collect data | IVA | IVA |
| 3.2 Accurately analyze and interpret data | 1h.2 Use terminology and describe basic principles of science | IVA, IVB, IVC, V | IVA, IVB |
| 3.3 Use quantitative methods to solve problems | 1h.3 Recognize the key elements of scientific investigation such as reliance on evidence, use of inductive reasoning, and control of variables | IVA, IVB, IVC, V | IVA |
| 3.4 Evaluate and draw inferences from mathematical models | 1h.4 Evaluate and interpret how science relates to contemporary events in everyday life | IVA, IVB, IVC | IVA, IVB |
|  | 1h.5 Reflect in and evaluate one’s own health |  | V |

**Test Description**

The College BASE test is a multiple choice criterion-referenced academic achievement examination, which evaluates students’ knowledge and skills in four subject areas; English, Mathematics, Science and Social Studies. The CBASE should be administered after a student has completed college-level core curriculum classes to get a better test on students’ knowledge. College BASE helps colleges assess academic progress as well as higher order thinking skills and tests effectiveness of college core classes. Within each of the four topics there are more specific clusters, which are groupings of topics within the subject. In total there are four subjects, nine clusters and 23 overall skills assessed. I will be covering the Mathematics and Science sections of the test. The Mathematics section has 56 multiple choice questions and contains three clusters of skills; general mathematics, algebra, and geometry. The Science section has 41 multiple choice questions and contains two clusters of skills; laboratory/field work and fundamental concepts.

**SUBJECT SCORES**

**MATHEMATICS**

*GENERAL MATHEMATICS*

* Practical applications
* Properties and notations
* Using statistics

*ALGEBRA*

* Evaluating expressions
* Equations and inequalities

*GEOMETRY*

* 2- & 3-dimensional figures
* Geometrical calculations

**SCIENCE**

*LABORATORY & FIELD WORK*

* Observation/experimental design
* Laboratory/field techniques
* Interpreting results

*FUNDAMENTAL CONCEPTS*

* Life sciences
* Physical sciences

\*Each subject is listed with its specific cluster and the skills, which are tested within the cluster. Across from each subject and cluster is the average score reported on a scale ranging from 40 to 560, with an average of 300. Skill scores are also reported on a scale of High, Medium, or Low.

**Methodology**

Gull Week testing is done to test student’s achievement of the General Education knowledge, skills and dispositions that the University believes all students should accomplish prior to graduation. The information which we gather during these testing periods will be used to demonstrate the skills that Salisbury University students develop and to improve the General Education program.

We have generated statistics on the overall demographics of Salisbury University students who have participated in Gull Week testing as well as for those who did not (we excluded graduate students).

Figure one is a comparison of the average High School GPA, SAT Verbal score, SAT Math score and Cumulative GPA for Salisbury University students who took the Gull Week assessment and for those who did not. Scores that were significantly different (had a p-value of less than .05) are indicated by the asterisk. We can see that there is a significant difference between High school GPA between the test takers (3.47) and the non-test takers (3.31), as well as a significant difference in SAT Math scores (545 vs. 537) and Cumulative GPA (2.96 vs 2.76). The SAT Verbal scores did not appear to differ greatly between those who took the Gull Week test and those who did not.

***Figure 1 - High School GPA, SAT scores, and Cumulative Grade Comparisons: Gull Week Test Takers Versus Non-Test Takers***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Label** | **Gull Week Test Takers** | | **Non-Test Takers** | |
|  | N | AVG(STD DEV) | N | AVG(STD DEV) |
| *High School GPA* | *456* | *3.47 (.960)\** | *3481* | *3.31 (1.02)\** |
| *SAT Verbal* | *600* | *529 (76.32)* | *4283* | *529 (74.82)* |
| *SAT Math* | *600* | *545 (80.28)\** | *4284* | *537 (76.97)\** |
| *Cumulative GPA* | *845* | *2.96 (.889)\** | *6770* | *2.76 (.987)\** |

*\*p < .05, groups are statistically significantly different*

Figure two displays the count and percentage of male and female participants and non-participants. A larger percentage of the test taker population is represented by females. However, the female population at Salisbury University is larger than the male population.

***Figure 2- Sex of Gull Week Test Takers Versus Non-Test Takers***

|  |  |  |  |
| --- | --- | --- | --- |
| **Label** | **Test Taker** | **Non-Test Taker** | **Total** |
| Male | 255 (30.2%) | 3028 (44.8%) | 3283 (43.1%) |
| Female | 589 (69.8%) | 3738 (55.2%) | 4327 (56.9%) |
| Total | 844 (100.0%) | 6766 (100.0%) | 7610 (100.0%) |

Figure three is a comparison of the cumulative GPA of test takers and non-test takers within each academic rank as well as each ranks’ percentages. The average scores that differed significantly are again indicated by the asterisk. It would appear that Freshmen (2.76 vs 2.30), Sophomores (2.96 vs 2.85) and Seniors’ (3.21 vs 3.10) Cumulative GPA are all significantly different between test takers and non-test takers while the Juniors do not differ significantly. As a whole it appears that each academic rank of test takers cumulative GPA is higher than that of the non-test takers’ cumulative GPA except for the Non-degree seeking students who had a lower GPA within the test takers. We can also see that freshman and sophomores are slightly overrepresented n the test population. Furthermore, seniors represent the largest percentage of students at the University, but juniors were the most highly participating.

***Figure 3 - Cumulative GPA Comparison by Academic Rank***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Label** | **Test Taker** | | **Non-Test Taker** | | **Total** |
|  | N | AVG(STD DEV) | N | AVG(STD DEV) |  |
| *Freshmen* | *173 (20.5%)* | *2.76 (1.14)\** | *980 (14.5%)* | *2.30 (1.29)\** | *1153 (15.1%)* |
| *Sophomores* | *210 (24.9%)* | *2.96 (.933)\** | *1433 (21.2%)* | *2.66 (1.03)\** | *1643 (21.6%)* |
| *Juniors* | *243 (28.8%)* | *2.94 (.816)* | *1812 (26.8%)* | *2.85 (.868)* | *2055 (27.0%)* |
| *Seniors* | *209 (24.7%)* | *3.21 (.485)\** | *2235 (33.0%)* | *3.10 (.515)\** | *2444 (32.1%)* |
| *Non-Degree* | *10 (1.2%)* | *1.61 (.131)* | *310 (4.6%)* | *1.72 (.147)* | *320 (4.2%)* |
| *Total* | *845 (100.0%)* |  | *6770 (100.0%)* |  | *7615 (100.0%)* |

*\*p < .05, groups are statistically significantly different*

\*Note due to rounding percentages may equal more than 100%

Figure five is the comparison of first time students, transfer students and unknown whom participated in Gull Week testing and those who did not participate (not taking the test). Total counts of each are also provided. It appears that first time students are overrepresented in the test taker population (72.5%) compared to their relative representation in the non-test taker population (58.5%). Of the test takers the first time students (72.5%) were more likely to participate opposed to the transfers (26.6%) and unknown (0.9%).

***Figure 5 - Gull Week Test Takers Versus Non-Test Takers***

|  |  |  |  |
| --- | --- | --- | --- |
| **Label** | **Test Taker** | **Non-Test Taker** | **Total** |
| Unknown | 8 (0.9%) | 224 (3.3%) | 232 (3.0%) |
| First Time Student | 613 (72.5%) | 3961 (58.5%) | 4574 (60.1%) |
| Transfer | 224 (26.6%) | 2585 (38.2%) | 2809 (36.9%) |
| Total | 845 (100.0%) | 6770 (100.0%) | 7615 (100.0%) |

Figure six is the comparison of all races/ethnicities present at Salisbury University who participated in Gull Week testing and who did not. Total count and percentages are also provided. The representation of each race/ethnicity is comparable between the test taker and non-test taker populations. We can see that Caucasians were the highest represented in Gull Week testing but they also are the highest represented on campus overall. The lowest participants in Gull Week testing are both the American Indian/Alaska Natives and the Native Hawaiian/Pacific Islanders. However, these are two of the smallest populations on campus. A total of 845 people participated in the Gull Week testing out of the whole population of 7615 students (this does not include graduate students). Of the known population 27.2% of test takers were minority students and 25.9% of the non-test takers were minority students.

***Figure 6 - Race/Ethnicity Gull Week Test Takers Versus Non-Test Takers***

|  |  |  |  |
| --- | --- | --- | --- |
| **Label** | **Test Taker** | **Non-Test Taker** | **Total** |
| African American | 116 (13.7%) | 848 (12.5%) | 964 (12.7%) |
| American Ind/Alaska Native | 1 (0.1%) | 31 (0.5%) | 32 (0.4%) |
| Asian | 28 (3.3%) | 171 (2.5%) | 199 (2.6%) |
| Hispanic | 33 (3.9%) | 273 (4.0%) | 306 (4.0%) |
| Native Hawaiian/Pacific Island | 1 (0.1%) | 10 (0.1%) | 11 (0.1%) |
| NRA | 23 (2.7%) | 153 (2.3%) | 176 (2.3%) |
| Two or More Races | 29 (3.4%) | 263 (3.9%) | 292 (3.8%) |
| Unknown/Not Specified | 29 (3.4%) | 231 (3.4%) | 260 (3.4%) |
| White | 585 (69.2%) | 4790 (70.8%) | 5375 (70.6%) |
| Total | 845 (100.0%) | 6770 (100.0%) | 7615 (100.0%) |

**CBASE Math and Science Sample**

Figure seven is a comparison of the average High School GPA, SAT Verbal score, SAT Math score and Cumulative GPA for Salisbury University students who took the CBASE Math assessment and for those who did not. Scores that were significantly different (had a p-value of less than .05) are indicated by the asterisk. We can see that there is no significant difference between High school GPA, SAT Verbal, SAT Math and Cumulative GPA between the CBASE math test takers and the non-CBASE math test takers.

***Figure 7 – High School GPA, SAT Scores, and Cumulative Grade Comparisons: CBASE Math Test Takers Versus Non-CBASE Math Test Takers***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Label** | **CBASE Math Test Takers** | | **Non-CBASE Math Test Takers** | |
|  | **N** | **AVG (STD DEV)** | **N** | **AVG (STD DEV)** |
| *High School GPA* | 50 | 3.54 (.964) | 3887 | 3.32 (1.02) |
| *SAT Verbal* | 69 | 516 (78.58) | 4814 | 529 (74.94) |
| *SAT Math* | 69 | 538 (83.12) | 4815 | 538 (77.34) |
| *Cumulative GPA* | 101 | 2.88 (.987) | 7514 | 2.78 (.978) |

Figure eight is a comparison of the average High School GPA, SAT Verbal score, SAT Math score and Cumulative GPA for Salisbury University students who took the CBASE Science assessment and for those who did not. Scores that were significantly different (had a p-value of less than .05) are indicated by the asterisk. We can see that there is a significant difference between SAT Math scores of those who took the CBASE science test (555) and those who did not (538). There is also a significant difference in the Cumulative GPA for those who took the CBASE Science test (3.05) versus those who did not (2.78). High school GPA and SAT Verbal scores did not appear to differ significantly between those who took the CBASE science test and those who did not.

***Figure 8 – High School GPA, SAT Scores, and Cumulative Grade Comparisons: CBASE Science Test Takers Versus Non-CBASE Science Test Takers***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Label** | **CBASE Science Test Takers** | | **Non-CBASE Science Test Takers** | |
|  | **N** | **AVG (STD DEV)** | **N** | **AVG (STD DEV)** |
| *High School GPA* | 85 | 3.52 (.101) | 3852 | 3.32 (.102) |
| *SAT Verbal* | 118 | 535 (70.56) | 4765 | 529 (75.11) |
| *SAT Math* | 118 | 555 (85.01)\* | 4766 | 538 (77.19)\* |
| *Cumulative GPA* | 159 | 3.05 (.778)\* | 7456 | 2.78 (.982)\* |

*\*p < .05, groups are statistically significantly different*

Figure nine displays the count and percentage of male and female participants in the CBASE Math test and non-CBASE Math participants. A larger percentage of the test taker population is represented by females. However, the female population at Salisbury University is larger than the male population

***Figure 9 – Sex of CBASE Math Test Takers Versus Non- CBASE Math Test Takers***

|  |  |  |  |
| --- | --- | --- | --- |
| **Label** | **CBASE Math Test Taker** | **Non-CBASE Math Test Taker** | **Total** |
| Male | 24 (23.8%) | 3259 (43.4%) | 3283 (43.1%) |
| Female | 77 (76.2%) | 4250 (56.6%) | 4327 (56.9%) |
| Total | 101 (100.0%) | 7509 (100.0%) | 7610 (100.0%) |

Figure ten displays the count and percentage of male and female participants in the CBASE Science test and non-CBASE Science participants. A larger percentage of the test taker population is represented by females. However, the female population at Salisbury University is larger than the male population

***Figure 10 – Sex of CBASE Science Test Takers Versus Non-CBASE Science Test Takers***

|  |  |  |  |
| --- | --- | --- | --- |
| **Label** | **CBASE Science Test Taker** | **Non-CBASE Science Test Taker** | **Total** |
| Male | 45 (28.3%) | 3238 (43.5%) | 3283 (43.1%) |
| Female | 114 (71.7%) | 4213 (56.5%) | 4327 (56.9%) |
| Total | 159 (100.0%) | 7451 (100.0%) | 7610 (100.0%) |

Figure eleven is a comparison of the cumulative GPA of test takers and non-test takers within each academic rank as well as each ranks’ percentages. The average scores that differed significantly are again indicated by the asterisk. It would appear that only Sophomores (3.31 vs 2.69) cumulative GPA are significantly different between test takers and non-test takers while all of the other ranks do not differ significantly. As a whole it appears that each academic rank of test takers cumulative GPA is higher than that of the non-test takers’ cumulative GPA. Juniors are slightly overrepresented in the test population (32.7%). Furthermore, Seniors represent the largest percentage of students at the University, but Juniors were the most highly participating in the CBASE Math.

***Figure 11 - Cumulative GPA Comparison by Academic Rank of CBASE Math***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Label** | **CBASE Math Test Taker** | | **Non-CBASE Math Test Taker** | | **Total** |
|  | N | AVG(STD DEV) | N | AVG(STD DEV) |  |
| *Freshmen* | 23 (22.8%) | *2.43 (.132)* | 1130 (15.0%) | *2.37 (.128)* | 1153 (15.1%) |
| *Sophomores* | 20 (19.8%) | *3.31 (.061)\** | 1623 (21.6%) | *2.69 (.103)\** | 1643 (21.6%) |
| *Juniors* | 33 (32.7%) | *2.89 (.092)* | 2022 (26.9%) | *2.86 (.086)* | 2055 (27.0%) |
| *Seniors* | 24 (23.8%) | *3.07 (.055)* | 2420 (32.2%) | *3.11 (.051)* | 2444 (32.1%) |
| *Non-Degree* | 1 (1.0%) | *0 (0)* | 319 (4.2%) | *1.73 (.146)* | 320 (4.2%) |
| *Total* | 101 (100.0%) |  | 7514 (100.0%) |  | 7615 (100.0%) |

*\*p < .05, groups are statistically significantly different*

\*Note due to rounding percentages may equal more than 100%

Figure twelve is a comparison of the cumulative GPA of test takers and non-test takers within each academic rank, the average scores that differed significantly are again indicated by the asterisk. It would appear that Sophomores (3.06 vs. 2.68) Cumulative GPA was the only rank that was significantly different between test takers and non-test takers while all the other ranks did not differ significantly. As a whole it appears that each academic rank of test takers cumulative GPA is higher than that of the non-test takers’ cumulative GPA. Sophomores are slightly overrepresented in the test population (28.9%). Furthermore, Seniors represent the largest percentage of students at the University, but Sophomores were the most highly participating in the CBASE Science.

***Figure 12 - Cumulative GPA Comparison by Academic Rank of CBASE Science***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Label** | **CBASE Science Test Taker** | | **Non-CBASE Science Test Taker** | | **Total** |
|  | N | AVG(STD DEV) | N | AVG(STD DEV) |  |
| *Freshmen* | 33 (20.8%) | *2.76 (.108)* | 1120 (15.0%) | *2.36 (.129)* | 1153 (15.1%) |
| *Sophomores* | 46 (28.9%) | *3.07 (.083)\** | 1597 (21.4%) | *2.68 (.103)\** | 1643 (21.6%) |
| *Juniors* | 40 (25.2%) | *3.06 (.060)* | 2015 (27.0%) | *2.86 (.087)* | 2055 (27.0%) |
| *Seniors* | 40 (25.2%) | *3.25 (.048)* | 2404 (32.2%) | *3.10 (.051)* | 2444 (32.1%) |
| *Non-Degree* | 0 (0.0%) | *0 (0)* | 320 (4.3%) | *1.72 (.146)* | 320 (4.2%) |
| *Total* | 159 (100.0%) |  | 7456 (100.0%) |  | 7615 (100.0%) |

*\*p < .05, groups are statistically significantly different*

\*Note due to rounding percentages may equal more than 100%

Figure fifteen is the comparison of first time students, transfer students and unknown whom participated in CBASE Math testing and those who did not participate in the CBASE Math test. Total counts of each are also provided. It appears that first time students are overrepresented in the test taker population (75.2%) compared to their relative representation in the non-test taker population (59.9%). Of the test takers the first time students (75.2%) were more likely to participate opposed to the transfers (23.8%) and unknown (1.0%).

***Figure 15 – CBASE Math Test Takers Versus Non-CBASE Math Test Takers***

|  |  |  |  |
| --- | --- | --- | --- |
| **Label** | **CBASE Math Test Taker** | **Non-CBASE Math Test Taker** | **Total** |
| Unknown | 1 (1.0%) | 231 (3.1%) | 232 (3.0%) |
| First Time Student | 76 (75.2%) | 4498 (59.9%) | 4574 (60.1%) |
| Transfer | 24 (23.8%) | 2785 (37.0%) | 2809 (36.9%) |
| Total | 101 (100.0%) | 7514 (100.0%) | 7615 (100.0%) |

Figure sixteen is the comparison of first time students, transfer students and unknown whom participated in the CBASE Science testing and those who did not participate in the CBASE Science test. Total counts of each are also provided. It appears that first time students are overrepresented in the test taker population (75.5%) compared to their relative representation in the non-test taker population (59.7%). Of the test takers the first time students (75.5%) were more likely to participate opposed to the transfers (24.5%) and unknown (0.0%).

***Figure 16 – CBASE Science Test Takers Versus Non-CBASE Science Test Takers***

|  |  |  |  |
| --- | --- | --- | --- |
| **Label** | **CBASE Science Test Taker** | **Non-CBASE Science Test Taker** | **Total** |
| Unknown | 0 (0.0%) | 232 (3.1%) | 232 (3.0%) |
| First Time Student | 120 (75.5%) | 4454 (59.7%) | 4574 (60.1%) |
| Transfer | 39 (24.5%) | 2770 (37.1%) | 2809 (36.9%) |
| Total | 7456 (100.0%) | 159 (100.0%) | 7615 (100.0%) |

Figure seventeen is the comparison of all races/ethnicities present at Salisbury University who participated in the CBASE Math test and who did not participate in the CBASE Math test. Total count and percentages are also provided. The representation of each race/ethnicity is comparable between the test taker and non-test taker populations. We can see that Caucasians were the highest represented in CBASE Math testing but they also are the highest represented on campus overall. The lowest participants in the CBASE Math test are both the American Indian/Alaska Natives and the Non-Resident Aliens (NRA). A total of 79 people participated in the CBASE Math test out of the whole population of 7615 students (this does not include graduate students). Of the known population 18.9% of CBASE Math test takers were minority students and 26% of the non-CBASE Math test takers were minority students.

***Figure 17 - Race/Ethnicity CBASE Math Test Takers Versus Non-CBASE Math Test Takers***

|  |  |  |  |
| --- | --- | --- | --- |
| **Label** | **CBASE Math Test Taker** | **Non-CBASE Math Test Taker** | **Total** |
| African American | 11 (10.9%) | 953 (12.7%) | 964 (12.7%) |
| American Ind/Alaska Native | 0 (0.0%) | 32 (0.4%) | 32 (0.4%) |
| Asian | 3 (3.0%) | 196 (2.6%) | 199 (2.6%) |
| Hispanic | 3 (3.0%) | 303 (4.0%) | 306 (4.0%) |
| Native Hawaiian/Pacific Island | 1 (1.0%) | 10 (0.1%) | 11 (0.1%) |
| NRA | 0 (0.0%) | 176 (2.3%) | 176 (2.3%) |
| Two or More Races | 1 (1.0%) | 291 (3.9%) | 292 (3.8%) |
| Unknown/Not Specified | 3 (3.0%) | 257 (3.4%) | 260 (3.4%) |
| White | 79 (78.2%) | 5296 (70.5%) | 5375 (70.6%) |
| Total | 101 (100.0%) | 7514 (100.0%) | 7615 (100.0%) |

Figure eighteen is the comparison of all races/ethnicities present at Salisbury University who participated in the CBASE Science test and those who did not participate in the CBASE Science test. Total count and percentages are also provided. The representation of each race/ethnicity is comparable between the test taker and non-test taker populations. We can see that Caucasians were the highest represented in the CBASE Science test but they also are the highest represented on campus overall. The lowest participants in the CBASE Science test are both the American Indian/Alaska Natives and the Native Hawaiian/Pacific Islanders. However, these are two of the smallest populations on campus. A total of 159 people participated in the CBASE Science test out of the whole population of 7615 students (this does not include graduate students). Of the known population 24% of test takers were minority students and 26% of the non-test takers were minority students.

***Figure 18 - Race/Ethnicity CBASE Science Test Takers Versus Non-CBASE Science Test Takers***

|  |  |  |  |
| --- | --- | --- | --- |
| **Label** | **CBASE Science Test Taker** | **Non-CBASE Science Test Taker** | **Total** |
| African American | 16 (10.1%) | 948 (12.7%) | 964 (12.7%) |
| American Ind/Alaska Native | 0 (0.0%) | 32 (0.4%) | 32 (0.4%) |
| Asian | 9 (5.7%) | 190 (2.5%) | 199 (2.6%) |
| Hispanic | 4 (2.5%) | 302 (4.1%) | 306 (4.0%) |
| Native Hawaiian/Pacific Island | 0 (0.0%) | 11 (0.1%) | 11 (0.1%) |
| NRA | 6 (3.8%) | 170 (2.3%) | 176 (2.3%) |
| Two or More Races | 3 (1.9%) | 289 (3.9%) | 292 (3.8%) |
| Unknown/Not Specified | 5 (3.1%) | 255 (3.4%) | 260 (3.4%) |
| White | 116 (73.0%) | 5259 (70.5%) | 5375 (70.6%) |
| Total | 159 (100.0%) | 7456 (100.0%) | 7615 (100.0%) |

**Results**

**-Reliability**

To test how consistent our measurement and data is we call on reliability. According to our reliability scores our test (CBASE Math and Science) is very dependable at assessing student’s knowledge on basic mathematics and science. Reliability is based on a KR-20 score and a KR-21 score, both have a range of 0.0 to 1.0 (1.0 being the highest and of the strongest consistency). The CBASE Math had a score of 0.912 for the KR 20 and a 0.902 for the KR 21. The CBASE Science had a score of 0.844 for the KR 20 and 0.828 for the KR 21. These scores are all conveying that there is a high level of reliability within the CBASE tests.

**-Validity**

Validity is a measure to convey how well a test can be generalized to the public, whether the test is measuring what it is claiming to, and whether it relates to other connected principles. When we are measuring validity we are using Pearson Correlation Coefficient, which is on a scale from -1 to 1. Figure nineteen displays a correlation chart. The highest correlation was between subject math was SAT Math (.787). The lowest correlation for subject math was the High School GPA (.071) and the lowest correlation for the subject science was also High School GPA (.054). (This excludes correlation of 1 because this is a correlation to the item itself). Refer to Appendix One for the full correlation table of all items.

***Figure 20 – Correlation Matrix***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Pearson Correlations** | **SAT Math** | **HSGPA** | **Cumulative GPA** | **Subject: Math** | **Subject: Science** |
| **SAT Math** | 1 | .268 | .215 | .787 | .599 |
| **HSGPA** | .268 | 1 | .317 | .071 | .054 |
| **Cumulative GPA** | .215 | .317 | 1 | .132 | .297 |
| **Subject: Math** | .787 | .071 | .132 | 1 | . |
| **Subject: Science** | .599 | .054 | .159 | . | 1 |

**-Item Analysis**

**-Performance**

Figure twenty one displays our outcomes of Mean, Median and Standard Deviation of scores within the CBASE Math test as well as in each cluster and skill. The median score for the Math Subject test is 285 and Salisbury University students scored slightly lower with a median of 278. As for each cluster; we scored lower for General Mathematics (280 vs. 291) and lower for Algebra (286 vs. 290). However, students did score higher for Geometry (295 vs. 282).

***Figure 21 – CBASE Math Outcomes according to Cluster and Skill***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **MATH** |  | **Mean** | **Median** | **Standard Deviation** |
| **Subject Math** |  | 290 | 278 | 65 |
| **Cluster** | **Skills** |  |  |  |
| General Mathematics |  | 290 | 280 | 68 |
|  | Practical Applications | 268 | 258 | 56 |
|  | Properties & Notations | 303 | 307 | 54 |
|  | Using Statistics | 309 | 318 | 54 |
| Algebra |  | 288 | 286 | 56 |
|  | Evaluating Expressions | 290 | 292 | 51 |
|  | Equations & Inequalities | 290 | 288 | 52 |
| Geometry |  | 294 | 295 | 56 |
|  | 2 & 3 Dimensional Figures | 308 | 324 | 51 |
|  | Geometrical Calculations | 284 | 277 | 52 |

\**Note: N=102*

Figure twenty two displays our outcomes of Mean, Median and Standard Deviation of scores within the CBASE Science test as well as in each cluster and skill. The median score for the Science Subject test is 285 and Salisbury University students scored a much higher mean of 294. As for each cluster; we scored higher for Lab & Field Work (298 vs. 273) and higher for Fundamental Concepts (296 vs.281).

***Figure 22 – CBASE Science Outcomes according to Cluster and Skill***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **SCIENCE** |  | **Mean** | **Median** | **Standard Deviation** |
| **Subject Science** |  | 296 | 294 | 64 |
| **Cluster** | **Skills** |  |  |  |
| Laboratory & Field Work |  | 299 | 298 | 59 |
|  | Observation/Experimental Design | 294 | 301 | 50 |
|  | Laboratory/Field Techniques | 300 | 302 | 50 |
|  | Interpreting Results | 305 | 307 | 46 |
| Fundamental Concepts |  | 292 | 296 | 58 |
|  | Life Sciences | 297 | 301 | 45 |
|  | Physical Sciences | 292 | 296 | 51 |

\**Note: N=162*

To determine if there were significant differences in CBASE Math performance by major, analysis of variance tests were run based on the school in which a student’s major falls. Sample sizes were similar between the four schools, though Seidel school representation was slightly lower. Additionally, seven undeclared students were included as a comparison group.

Figure 23 displays an analysis of variance based on the performance by each school for the CBASE Math. Students with a major in the Henson school scored the highest with a mean of 310.54 while undeclared students scored the lowest with a mean of 275.86, just barely lower than the Seidel school whose mean was 275.94. According to an ANOVA comparison the schools did not differ significantly with a p value of .326 (partial eta squared = .047). Post hoc comparisons also did not show statistical significance in its comparisons between school CBASE Math scores.

***Figure 23 – Performance by School CBASE Math***

|  |  |  |  |
| --- | --- | --- | --- |
| **School** | **N** | **Mean** | **Standard Deviation** |
| **Fulton** | 28 | 279.79 | 62.996 |
| **Henson** | 26 | 310.54 | 73.696 |
| **Perdue** | 22 | 295.82 | 62.620 |
| **Seidel** | 18 | 275.94 | 57.213 |
| **Undeclar** | 7 | 275.86 | 56.037 |
| **Total** | 101 | 290.24 | 64.757 |

To determine if there were significant differences in CBASE Science performance by major, analysis of variance tests were run based on the school in which a student’s major falls. Sample sizes were similar between the four schools, though Purdue school representation was slightly lower. Additionally, nine undeclared students were included as a comparison group.

Figure 24 displays an analysis of variance based on the performance by each school for the CBASE Science. Students with a major in the Henson school scored the highest with a mean of 318.02 while Fulton students scored the lowest with a mean of 281.47. According to an ANOVA comparison the schools did differ significantly with a p value of .042 (partial eta squared = .061). However, Post hoc comparisons also did not show statistical significance in its comparisons between school CBASE Science scores.

The overall ANOVA tests for the relationship between the independent variable (group) and the dependent variable (test scores). The post hoc comparisons, using Tukey’s HSD, test for statistical significance between paired comparisons for the different pairings of the independent variable. The two tests test for different things. Also, ANOVA is more sensitive to finding statistically significant difference than pairwise comparisons using Tukey’s HSD. Tukey’s HSD more stringently controls for Type I error, thus it requires a larger difference to indicate that results are statistically significantly different.

***Figure 24 – Performance by School CBASE Science***

|  |  |  |  |
| --- | --- | --- | --- |
| **School** | **N** | **Mean** | **Standard Deviation** |
| **Fulton** | 40 | 281.47 | 51.941 |
| **Henson** | 47 | 318.02 | 70.227 |
| **Perdue** | 28 | 293.25 | 48.939 |
| **Seidel** | 37 | 282.51 | 74.507 |
| **Undeclar** | 9 | 310.33 | 47.652 |
| **Total** | 161 | 296.04 | 63.972 |

To determine if there were significant differences in CBASE Math performance by first time or transfer student, analysis of variance tests were run based on whether the student was entering Salisbury University with no prior college instruction or if they were transferring from another university. Sample sizes were similar between the two, although Transfer representation was slightly lower.

Figure 25 displays an analysis of variance based on the performance by First time or Transfer student for the CBASE Math. First time students scored higher with a mean of 293.67. According to an ANOVA comparison the schools did not differ significantly with a p value of .285 (partial eta squared = .012). Post hoc comparisons for CBASE Math of First Time and Transfer students were not able to run because there are fewer than 3 groups.

***Figure 25 – Performance by First Time and Transfer Students CBASE Math***

|  |  |  |  |
| --- | --- | --- | --- |
| **First Time or Transfer** | **N** | **Mean** | **Standard Deviation** |
| **First Time** | 76 | 293.67 | 66.798 |
| **Transfer** | 24 | 277.33 | 58.019 |
| **Total** | 100 | 289.75 | 64.896 |

To determine if there were significant differences in CBASE Science performance by first time or transfer student, analysis of variance tests were run based on whether the student was entering Salisbury University with no prior college instruction or if they were transferring from another university. Sample sizes were similar between the two, though Transfer representation was slightly lower.

Figure 26 displays an analysis of variance based on the performance by First time or Transfer student for the CBASE Science. First time students scored higher with a mean of 299.13. According to an ANOVA comparison the schools did not differ significantly with a p value of .273 (partial eta squared = .008). Post hoc comparisons of CBASE Science of First Time and Transfer students were not able to run because there are fewer than 3 groups.

***Figure 26 – Performance by First Time and Transfer Students CBASE Science***

|  |  |  |  |
| --- | --- | --- | --- |
| **First Time or Transfer** | **N** | **Mean** | **Standard Deviation** |
| **First Time** | 122 | 299.13 | 61.424 |
| **Transfer** | 40 | 286.35 | 70.432 |
| **Total** | 162 | 295.98 | 63.779 |

To determine if there were significant differences in CBASE Math performance by mhec level, analysis of variance tests were run based on the number of credits which a student has accumulated. Sample sizes were similar between the five academic levels, though sophomores’ representation was slightly lower. Additionally, one non-degree student were included as a comparison group.

Figure 27 displays an analysis of variance based on the performance by each academic rank for the CBASE Math. The single non-degree student scored the highest with a mean of 339.00 while freshmen scored the lowest with a mean of 274.70. According to an ANOVA comparison the schools did not differ significantly with a p value of .689 (partial eta squared = .023). Post hoc comparisons also did not show statistical significance in its comparisons between mhec level of CBASE Math, we did not include non-degree in post hoc comparison due to N=1.

***Figure 27 – Performance by MHEC Level CBASE Math***

|  |  |  |  |
| --- | --- | --- | --- |
| **MHEC Level** | **N** | **Mean** | **Standard Deviation** |
| **Freshman** | 23 | 274.70 | 51.032 |
| **Sophomore** | 20 | 295.80 | 47.383 |
| **Junior** | 33 | 295.94 | 75.146 |
| **Senior** | 24 | 290.62 | 74.909 |
| **Non-Degree** | 1 | 339.00 | . |
| **Total** | 101 | 290.24 | 64.757 |

To determine if there were significant differences in CBASE Science performance by mhec level, analysis of variance tests were run based on the number of credits which a student has accumulated. Sample sizes were similar between the four academic levels, though freshmen representation was slightly lower.

Figure 28 displays an analysis of variance based on the performance by each academic rank for the CBASE Science. Sophomore’s scored the highest with a mean of 309.04 while freshmen scored the lowest with a mean of 287.82, just slightly below seniors whose mean was 288.41. According to an ANOVA comparison the schools did not differ significantly with a p value of .388 (partial eta squared = .019). Post hoc comparisons also did not show statistical significance in its comparisons between mhec level of CBASE Science scores.

***Figure 28 – Performance by MHEC Level CBASE Science***

|  |  |  |  |
| --- | --- | --- | --- |
| **MHEC Level** | **N** | **Mean** | **Standard Deviation** |
| **Freshman** | 34 | 287.82 | 55.138 |
| **Sophomore** | 46 | 309.04 | 61.331 |
| **Junior** | 40 | 295.90 | 71.931 |
| **Senior** | 41 | 288.41 | 65.372 |
| **Total** | 161 | 296.04 | 63.972 |

**Item Analysis**

We did not have individual data to analyze for item level of difficulty or reliability for cluster or skill.

**Summary**

Gull Week testing provided us with many different noteworthy findings about our student body’s knowledge upon taking Salisbury University’s general education courses. In this section I will discuss various significant findings within the CBASE Math and Science outcomes.

The Salisbury University population who participated in Gull Week testing seems to be representative of the overall Salisbury University population. We found that CBASE Math and Science test takers have a higher high school and cumulative GPA than those students who did not take the CBASE test. We also found that SAT verbal and math scores were higher in CBASE Science test takers opposed to non-CBASE science test takers. SAT verbal scores were lower and SAT math scores were the same for students who took the CBASE Math compared to those who did not take the CBASE math.

For gender outcomes we found that overall more females participated in the CBASE math and science testing. Next, we tested differences among academic level for the CBASE math and science. We found that juniors were the highest participating in the CBASE math and sophomores were the highest participating in CBASE Science. Meanwhile, non-degree was lowest participating in CBASE math and freshmen were the lowest participating in CBASE science. Significant differences were found between the GPA of Sophomores who took the CBASE math opposed to those who did not. A significant difference was also found between sophomores who took the CBASE Science opposed to those who did not.

Additionally, comparisons of first time and transfer students were also performed. Within the CBASE math and science we found that first time students had a larger participating group than transfer students. Race/ethnicity was also taken into account and we found that within the CBASE math Caucasian was the highest participating and Native Hawaiian/Pacific Island and two or more races was the lowest participating. In the CBASE science Caucasian was also highest participating and two or more races were the lowest.

Moreover, we also ran tests of validity on our CBASE test and found that the highest measure of validity was between the Subject Math and Subject Science of the CBASE test while the lowest was between the Subject science and high school GPA. Furthermore we investigated the median scores for each cluster and skill within the CBASE subject tests (math and science).

As a whole Salisbury University had lower median scores in the math subject test than the median scores pooled from other schools. We found that our Salisbury University students had the highest performance median in the Geometry cluster and had lowest performance median score within the Algebra cluster. When we compared our median scores to that of other universities pooled median scores we found that Salisbury University students had a higher median score within the science subject test. Our highest performance median score was in the Laboratory and Field Work cluster and our lowest median score was within the Fundamental Concepts.

Our next analysis included breaking down the data too look at performance based on school, first time versus transfer students, and academic rank. When we compared mean scores of CBASE math between the different schools (Fulton, Henson, Perdue, Seidel, and Undeclared) we found that Henson had the highest mean score while Undeclared had the lowest mean score. Then we looked at the CBASE science scores between the schools and we found that Henson again had the highest mean score, but this time Fulton had the lowest mean score.

Next we looked at differences in scoring among first time and transfer students here at the university. Within the CBASE math and science we found that first time students had a higher mean score. Lastly, we compared mean scores between academic rank (freshman, sophomore, Junior, Senior, and Non-Degree). We found that a single non-degree participant had the highest mean in the CBASE math (second highest mean was juniors) and the lowest mean score was freshman. In the CBASE science we found that sophomores had the highest mean score while freshman had the lowest mean score.

The data that we have collected is very important to the University and will be used along with the data from the other tests administered to decide whether or not the general education courses here at Salisbury University need to be altered in any way. From the data that I have collected it would appear that perhaps our weakest point and area which may need reform is within mathematics. While our scores were higher for geometry they were below the pooled median from other universities in clusters for general mathematics and algebra. Mathematics is a skill set that we will utilize for the rest of our lives and if students here at Salisbury University are struggling with the fundamentals in mathematics it is something that needs to be address immediately.

**Appendix One**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | SAT M | HSGPA | Cumulative GPA | Subject: Math | Cluster: General Math | Skill: Practical Applications | Skill: Properties and Notations | Skill: Using Statistics | Cluster: Algebra | Skill: Evaluating Expressions | Skill: Equations and Inequalities | Cluster: Geometry | Skill: 2-& 3- Dimensional Figures | Skills: Geometrical Calculations | Subject: Science | Cluster: Laboratory & Field Work | Skill: Observation/ Experimental Design | Skill: Labortatory/Field Techniques | Skill: Interpreting Results | Cluster: Fundamental Concepts | Skill: Life Sciences | Skill: Physical Sciences |
| SAT Math | 1 | .268 | .215 | .787 | .761 | .652 | .689 | .672 | .655 | .581 | .582 | .689 | .618 | .575 | .599 | .616 | .367 | .592 | .514 | .445 | .401 | .395 |
| HSGPA | .268 | 1 | .317 | .071 | .054 | -.015 | .071 | .085 | .080 | -.022 | .144 | .027 | .051 | -.018 | .054 | .080 | .034 | .162 | .026 | .025 | .046 | .002 |
| Cumulative GPA | .215 | .317 | 1 | .132 | .159 | .103 | .203 | .140 | .118 | .101 | .107 | .052 | .125 | -.023 | .297 | .306 | .239 | .282 | .259 | .263 | .268 | .225 |
| Subject: Math | .787 | .071 | .132 | 1 | .918 | .814 | .789 | .770 | .833 | .750 | .740 | .882 | .726 | .776 | . | . | . | . | . | . | . | . |
| Cluster: General Math | .761 | .054 | .159 | .918 | 1 | .901 | .853 | .856 | .627 | .587 | .534 | .764 | .672 | .638 | . | . | . | . | . | . | . | . |
| Skill: Practical Applications | .652 | -.015 | .103 | .814 | .901 | 1 | .650 | .636 | .525 | .483 | .452 | .692 | .602 | .587 | . | . | . | . | . | . | . | . |
| Skill: Properties and Notations | .689 | .071 | .203 | .789 | .853 | .650 | 1 | .660 | .556 | .531 | .476 | .685 | .636 | .546 | . | . | . | . | . | . | . | . |
| Skill: Using Statistics | .672 | .085 | .140 | .770 | .856 | .636 | .660 | 1 | .533 | .509 | .444 | .614 | .556 | .499 | . | . | . | . | . | . | . | . |
| Cluster: Algebra | .655 | .080 | .118 | .833 | .627 | .525 | .556 | .533 | 1 | .899 | .906 | .618 | .492 | .557 | . | . | . | . | . | . | . | . |
| Skill: Evaluating Expressions | .581 | -.022 | .101 | .750 | .587 | .483 | .531 | .509 | .899 | 1 | .637 | .541 | .419 | .497 | . | . | . | . | . | . | . | . |
| Skill: Equations and Inequalities | .582 | .144 | .107 | .740 | .534 | .452 | .476 | .444 | .906 | .637 | 1 | .562 | .467 | .493 | . | . | . | . | . | . | . | . |
| Cluster: Geometry | .689 | .027 | .052 | .882 | .764 | .692 | .685 | .614 | .618 | .541 | .562 | 1 | .837 | .877 | . | . | . | . | . | . | . | . |
| Skill: 2-&3-Dimensional Figures | .618 | .051 | .125 | .726 | .672 | .602 | .636 | .556 | .492 | .419 | .467 | .837 | 1 | .475 | . | . | . | . | . | . | . | . |
| Skill: Geometrical Calculations | .575 | -.018 | -.023 | .776 | .638 | .587 | .546 | .499 | .557 | .497 | .493 | .877 | .475 | 1 | . | . | . | . | . | . | . | . |
| Subject: Science | .599 | .054 | .297 | . | . | . | . | . | . | . | . | . | . | . | 1 | .945 | .786 | .723 | .775 | .900 | .783 | .833 |
| Cluster: Laboratory & Field Work | .616 | .080 | .306 | . | . | . | . | . | . | . | . | . | . | . | .945 | 1 | .818 | .782 | .823 | .716 | .634 | .657 |
| Skill: Observation/Experimental Design | .367 | .034 | .239 | . | . | . | . | . | . | . | . | . | . | . | .786 | .818 | 1 | .393 | .490 | .623 | .568 | .560 |
| Skill: Laboratory/field Techniques | .592 | .162 | .282 | . | . | . | . | . | . | . | . | . | . | . | .723 | .782 | .393 | 1 | .601 | .527 | .467 | .483 |
| Skill: Interpreting Results | .514 | .026 | .259 | . | . | . | . | . | . | . | . | . | . | . | .775 | .823 | .490 | .601 | 1 | .586 | .507 | .552 |
| Cluster: Fundamental Concepts | .445 | .025 | .263 | . | . | . | . | . | . | . | . | . | . | . | .900 | .716 | .623 | .527 | .586 | 1 | .866 | .932 |
| Skill: Life Sciences | .401 | .046 | .268 | . | . | . | . | . | . | . | . | . | . | . | .783 | .634 | .568 | .467 | .507 | .866 | 1 | .629 |
| Skill: Physical Sciences | .395 | .002 | .225 | . | . | . | . | . | . | . | . | . |  |  | .833 | .657 | .560 | .483 | .552 | .932 | .629 | 1 |