

## **Empirical and Quantitative Reasoning Sub-Committee Report**

May 9<sup>th</sup>, 2018

The Empirical and Quantitative Reasoning sub-committee reviewed the Core Assessment data relating to Empirical and Quantitative Skills for Academic Year 2016-2017 which consisted of data from two direct measures: the Critical Thinking Assessment Test (CAT) and the Texas Assessment of Critical Thinking Skills (TACTS) and one indirect measure: the National Survey of Student Engagement (NSSE). In cases where datasets from previous assessment cycles were available, comparisons were made to identify trends. The following notations and recommendations were made.

### **Recommendations for Further Ways to Explore our Data:**

It would be very helpful to obtain the scoring rubrics for the CAT and the TACTS questions that assess empirical and quantitative reasoning. This would allow for further breakdown in scores and understanding of our student outcomes. We also were not able to obtain the specific items on the TACTS that assess only the empirical and quantitative reasoning skills. Currently, it is impossible to interpret the TACTS results of these skills versus critical thinking.

It would also be informative to get a better understanding of the comparison samples for this data. Additionally, if there would be a way to compare our student results to similar institutions. For example, we have a large population of students who are first generation students at our university. It would be more informative to determine if we are comparing similar student populations. Our students, as indicated thus far in the results, are scoring lower on almost all measures of empirical and quantitative reasoning than the national norm scores. Is this because our students are not obtaining enough knowledge in this component area, or are our

students being compared to Universities that have different student populations? It would be helpful to answer that question and compare similar student populations.

Since Sam IDs are recorded when data is collected, we believe a breaking down of data by college, and in some cases by department, will be beneficial. Such breakdown helps in addressing problem that may pertain to specific colleges and majors. In the data provided to us, only CAT was broken down by college/major.

### **Recommendations Regarding What Additional Data are Needed to fill Remaining Assessment Gaps:**

Most of the concerns identified by the subcommittee stem from the assessment methods used to measure empirical and quantitative skills. The CAT and TACTS are designed to measure two separate sets of core skills: critical thinking & empirical and quantitative skills. We believe it is important to identify the specific areas within CAT and TACTS relating to each core skill in order to better understand and evaluate the data. Although the CAT data does provide a question-by-question item analysis, the committee believes that reviewing the questions is important when trying to disaggregate the data. The committee also suggests that the inclusion of the TACTS questions with the data, for the same reasons. In addition, we also need to know the scoring rubrics of these two tests.

Also, the CAT contains self-reported demographic variables. If a breakdown of data according to demographics are of interest, then matching Sam IDs with student demographics in the University database may be helpful. The committee believes this is of little value, as curricular issues cannot be addressed by demographics but it would assist with validating the data.

Since the NSSE has only been administered once, there is currently only one data set to review. The committee is interested in seeing the spring 2018 data set for comparison. The committee would also like further information on how students are being sampled for the NSSE.

The committee also discussed major-specific courses that cover empirical and quantitative reasoning. For example, in the College of Business Administration (COBA) every student is required to take BANA3363 Intermediate Business Analysis. Similarly, every student in the College of Criminal Justice is required to take CRIJ 3378 Intro to Methods of Research. Since Sam IDs are recorded during the assessments, we can divide students into those who have and have not taken either of these major specific courses to see a pre- and post- effect, as well as comparing student scores in CAT and/or TACTS to course grades. We think similar courses can be found in the College of Health Sciences and the College of Science & Engineering Technology, while we are unsure about a college-wide quantitative course in the College of Education and College of Humanities and Social Sciences.

One other recommendation is to compare student scores in CAT and/or TACTS using this pre- and post- effect to courses in Core Curriculum Component Areas II Mathematics and III Life and Physical Sciences. Pre- and post-effect analyses could be compared by student year as well. Senior students should be scoring higher on empirical and quantitative reasoning than the freshmen if we are doing our job teaching these skills. These comparisons could yield data that captures practice and application of empirical and quantitative skills in the classroom.

**Recommendations for Improvements that can be Made in Response to Currently Available Data that can be Taken to Academic Affairs Leadership:**

The committee noticed a trend among the CAT scoring for the 2015-2016 and 2016-2017 assessment cycles. The CAT data indicates that SHSU students have consistently scored the lowest on questions where the following skills were being assessed: “Identify additional

information needed to evaluate a hypothesis” and “Explain how changes in a real-world problem situation might affect the solution.” This may need further and more in-depth review since our students are consistently scoring lowest in these two skillsets.

Although there is not a considerable difference in SHSU student responses compared to IPEDS and THECB peer groups, the NSSE data indicates that the students do not feel that they utilizing empirical and quantitative skills. This may be due to the nature of the questioning, “During the **current** school year...”, but is also something that may require further review.

As stated above, the CAT and/or TACTS data may be used to evaluate if college-specific quantitative courses and/or Core Curriculum courses have improved students’ empirical and quantitative reasoning skills.

Moving forward, we also suggest a sampling method other than faculty/student volunteers.