2018 – 2019/2019 – 2020 General Education Executive Summary

Department: Business & Mathematics	**Date:** 07/09/2019
Members involved with analysis of artifacts: A. Langewisch, M. Gubanyi, J. Anderson, R. Smallfoot	
General Education Assessment Plan: a) Learning Outcome; b) Background; c) Question(s); d) Methodology	

Analysis of artifacts:

1). PERFORMANCE CRITERIA* - How was data analyzed? (attach rubrics/scoring tools if used).
One professor scored problem 8 of the final for his section of Math 122 against the rubric: exceeds expecations (demonstrates mastery of concept), meets expectations (understands concept but with minor errors), needs improvement (understands concept but with major errors), or unacceptable (demonstrates lack of understanding). Problem 8 was a hypothesis test for the difference between two means with the t distribution. Three attributes (sub-points of the learning objective) of Problem 8 were scored: stating the hypothesis, calculating test statistics, and drawing conclusions. A second professor used the same three attributes and the same rubric, referencing a t-test based on a word problem from the final exam, which was the second time these students were tested on this concept in an exam setting. A third professor used a learning target approach, where students may re-test particular targets if missed on prior exams. A test uses 2-3 problems to assess the learning target.

There are 40 "Learning Targets" for the course. Three Learning Targets were relevant to this assessment, i.e. they addressed hypothesis testing and a reasonable amount of time was devoted to the subject during class: #30. Test hypothesis for one proportion. #31 Test hypotheses for one mean. #32. Test hypotheses for two proportions. For this third professor, the attributes are all expressed as one score, and the rubric above was mapped to two possible levels: passing equates to exceeding or meeting expectations, and not passing equates to needs improvement or unacceptable.

Summary of RESULTS*:

1). Restate the assessment question(s) (from the Assessment plan):
Are students proficient in stating hypotheses, calculating test statistics, and drawing conclusions from a statistical hypothesis test?

2). Summarize the assessment results. A narrative summary is required. Charts, tables or graphs are encouraged but optional.
For the first professor, the three parts (stating hypotheses, calculating test statistics, and drawing conclusions), the relative percentages for exceeds expectations, meets expectations, needs improvement, and unacceptable were: States hypothesis: 30%, 40%, 20%, 10%; Calculates test statistics: 60%, 20%, 20%, 0%; and Drawing conclusions, 20%, 60%, 10%, 10%. For the second professor, the relative percentages were: States hypothesis: 72%, 4%, 17%, 8%; Calculates test statistics: 55%, 28%, 6%, 11%; and Drawing conclusions: 17%, 58%, 11%, 13%. For the third professor, out of 31 students, 18, 19, and 14 passed Learning Targets #30, #31, and #32, respectively.

3). INTERPRETATION* - Discuss how the results answer the assessment question(s).
For the first professor, 70%, 80%, and 80% of the students met or exceeded the expectations for the three parts above. For the second professor, 75%, 83%, and 75% met or exceed expectations. For the third professor, the met- or exceed-rate varied from 58% to 61% to 45%.

4). Observations made that were not directly related to the question(s). (i.e. interrater reliability of the scoring tool was low) The third professor provided some extra data that was helpful. From it, we prepared a met-or-exceeded chart for all 40 Learning Targets. See the attached. It indicates that quite a significant percentage of students did not meet expectations for the middle set of Learning Targets. It could be that these students started strong, then knew they could pass the course with an acceptable grade without meeting these harder objectives and did not try as hard, or it could be that they just did not ever understand these more comprehensive, integrated concepts from the field of statistics.

Sharing of Results: *When were results shared? Date*: 7/9/2019
How were the results shared? (i.e. met as a department) Email
Who were results shared with? (List names): E. Reinke, B. Albright, A. Langewisch, M. Gubanyi, J. Gubanyi, R. Smallfoot, J. Anderson

Discussion of Results –Summarize your conclusions including:

1. ACTION*- How will what the department learned from the assessment impact:
 a. Teaching: Those who teach the Statistics course recognize that by the time of the final, a lot of cumulative understanding of statistics needs to have sunk in order for students to meet or exceed expectations for

hypothesis testing. The overall meet-or-exceed rates, while not uniformly meeting the target of 80%, are encouraging, but there is always the desire and professional drive to help even more students do well. Amongst the set of professors teaching this GE course, professors take different approaches to teaching and assessing learning. The assessment cycle gives us data upon which to continue the discussion about ways to improve student learning.

    b. *Assignment/course*: Tests requiring demonstration of stating hypotheses, calculating test statistics, and drawing conclusions will continue be a core element of Math 122 Statistics.

    c. *Program:* The GE mathematics requirement for many programs will continue to be Math 122 Statistics.

    d. *Assessment:* Assessing via tests is a valid method of assessing the broad theme of analysis.

2. **IMPACT****-* *What is the anticipated impact of the* **ACTION*** *on student achievement of the learning outcome in the next academic year?*   We anticipate most students will meet or exceed, but we have no illusion that all or nearly all will.

3. **BUDGET IMPLICATIONS** *– Indicate budget requirements necessary for the successful implementation of the* **ACTION*** *(i.e. an additional staff person, new equipment, additional sections of a course).*   none

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If action is taken – it is recommended that the same learning outcome and assessment plan be used for a second assessment cycle.

What assessment questions related to the learning outcome would the program like to investigate in the future? This is a good question to focus on over a longer period of time.

Submitted by:A. Langewisch   **Assessment Committee Reviewed:** 7/16/19

Department Chair notified – approval/additional action needed:approved

BUDGET IMPLICATIONS – Assessment Committee Chair notified appropriate Dean: na