**#2. Executive Summary: Undergraduate Program Assessment:**

**Student Outcomes – Gen Ed**

To be completed by Departments and submitted to the BlackBoard assessment site.

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| **Department:** **Natural Sciences Date:** **28 June 2016** |
| **Members involved with analysis of artifacts:** **Dr. John Jurchen, Dr. Kristy Jurchen, Dr. Rob Hermann, Dr. Brent Royuk, Dr. Kyle Johnson, Dr. Connie Callahan, Dr. Tim Huntington, and Jen Fruend** |
| **See Undergraduate Program Outcome Assessment Plan: Student Outcomes – Gen Eds for:** 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).*  For Chem 109 Principles of Chemistry, answers from a pre-unit test question, a unit exam, and final exam for 33 students were compared. For Phys 109 a pre-lecture survey, a unit exam question, and a final exam question were compared for 71 students. For Sci 202 Science of Everyday Things 36 answers to a unit exam question were evaluated (no preunit questions were asked for Sci 202). (Note: The Department Chair failed to inform the instructor for Bio 207 that this course would be included in the assessment, so no data were collected for that course.) All question answers were assessed based on the following rubric: Yes, they understood the concept; No, they did not understand the concept. For the pre-test or pre-instruction surveys there were no artifacts, just the survey results to compare.For the exam questions, we looked at each artifact together and then decided as a group whether or not the students understood the concept. |
| **Summary of RESULTS\*:**  *1). Restate the assessment question(s) (from the Assessment plan):*  Do students gain a broad understanding of key concepts?  *2). Summarize the assessment results. A narrative summary is required. Charts, tables or graphs are encouraged but optional*.  For Chem 109, to see if students understood the concept of phase change, the initial (immediately post-lecture) question asked was, "What are in the bubbles when you boil water?" and 22% answered correctly. After reinforcement over the next several days, 100% of the students answered the question correctly on the unit exam. At the end of the semester (after more reinforcement) 79% answered correctly to a question with a different set of choices (which made the answer more difficult).  For Phys 109 the students were surveyed before instruction to answer the questions: A father and small son on roller skates at rest push against each other. Who feels the larger force? Who accelerates more? At that time 11% answered the first question correctly and 49% answered the second correctly. On the unit test the question was: A small automobile collides with a large truck. Which vehicle feels the larger force? Which feels the larger acceleration? Here 47% answered the first question correctly, and 80% answered the second correctly. On the final the students were asked: A car driving down the highway hits a bug, which splatters on the windshield. Which experiences the greater force, the car or the bug? Which experiences the greater acceleration? 58% answered the first question correctly, 87% answered the second correctly.  For Sci 202 the students were asked to explain the difference between a theory and a law. 81% answered correctly, 19% did not (either explaining one incorrectly or both poorly).  *3).* ***INTERPRETATION****\* - Discuss how the results answer the assessment question(s).*  We were hoping to find out two things with this assessment. First, we wanted to know if the concepts we chose to assess from our courses were appropriate for the class. We attempted to answer this question by asking the students before the concept was covered in the class to explain the concept. We decided that if fewer than 50% of the students already understood the concept, then the concept was not already understood and was appropriate for the course and for the assessment. In the two classes we addressed this quantitatively Chem 109 and Phys 109, the students' understanding of the concept was at 22% and 49% resprectively before the concept was covered in class. In Sci 202 the vast majority of the class did not show understanding before instruction. This supported our hypothesis that students did not already understand the concept before taking the class.  Our second goal was that 80% of the students would demonstrate understanding of the concept after it had been covered in class. In Chem 109 (100% unit test, 79% final exam), in Sci 202 (81%), and in Phys 109 (80% unit test and 87% final exam) for Newton's second law we met our goal and students generally understood the concept after instruction. Only in Phys 109 for Newton's third law (47% unit test, 58% final exam) was the goal of understanding not met, though it improved significantly and was not actually part of the original assessment question (which addressed only Newton's second law).  In the discussion following the assessment, several points were made: (1) Intentionally focusing on these (worthwhile) concepts did lead to general understanding, but (2) this should not be (and did not appear to be) at the expense of other topics or with a feel of "teaching to the test".  We also felt that though we met our goal, we wanted to see if it was an abberation or sustainable, so decided to continue this set of questions for one more year.  4). *Observations made that were not directly related to the question(s).* (*i.e. interrater reliability of the scoring tool was low*) None |
| **Sharing of Results:**  *When were results shared? Date*: 28 June 2016  *How were the results shared? (i.e. met as a department)* We met as a department to assess and discuss the results.  *Who were results shared with? (List names):* Dr. John Jurchen, Dr. Kristy Jurchen, Dr. Rob Hermann, Dr. Brent Royuk, Dr. Kyle Johnson, Dr. Connie Callahan, Dr. Tim Huntington, and Jen Fruend |
| **Discussion of Results –Summarize your conclusions including:**  *1.* **ACTION\*-** *How will what the department learned from the assessment impact the teaching process/course/program etc. in your department starting the next academic year?*  We determined that we will be more intentional about identifying truly pivotal concepts in our courses and making sure that those are reinforced in lectures, activities, homework, and on multiple exams.  *2.* **IMPACT\*-** *What is the anticipated impact of the* **ACTION\*** *on student achievement of the learning outcome in the next academic year?*  We anticipate that students will continue to generally gain an understanding of the key concepts we are assessing, and that by following the action described above additional key concepts will be more broadly understood.  *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 |
| ***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?*** **We will address the same learning outcome - Do students gain a broad understanding of key concepts? - one more year, in Chem 109, Phys 109, Sci 202, and in Bio 110 instead of Bio 207 (since it has a full-time faculty teaching it).** |
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| **Submitted by:** **Rob Hermann Reviewed by the Assessment Committee (date):** |
| **Department Chair notified/additional action needed:** **6/29/16**  **BUDGET IMPLICATIONS – Assessment Committee Chair notified appropriate Dean:** **na**  **Approved & Posted to Assessment site:** **6/29/16** |