What is your College or School?
  College of Arts & Sciences

What is your program?
  Math & Computer Science (Math, Computer Science, Data Analytics, Math Secondary Ed)

For Math & Computer Science (Math, Computer Science, Data Analytics, Math Secondary Ed), what program or programs are you completing a report for? Select all that apply. Please note that eventually all programs must be assessed at the program level.
  Data Analytics

Outcome(s): Identify the program learning outcome(s) that is/are the focus for the 2017-18 Academic Year.
  Given a data analytics problem, students will identify subproblems necessary to address the main problem, collect relevant data, and effectively communicate results as appropriate for the audience.

Measures: Identify one to three ways you know students learn this outcome.
  We chose to measure this outcome in CS/STAT 190: Case Studies in Data Analytics, the capstone course for the major. Students are presented with some problems and data from community and industry partners and are challenged to apply what they have learned in their major, walking the problem through the complete project lifecycle, which includes identification of subproblems, collections of relevant data, and effective communication. Students worked on these projects in teams and then completed individual essays in which they reflected on these learning objectives.

  The essay prompt included several questions; among them were the following, which directly asked about the learning outcomes, given above.

  • What subproblems did your group identify that helped you address the main problem? Why were these the right subproblems to look at or how did they help you address the main question?
  • What data did you collect to solve the problems you identified? Why was this data what you needed to satisfy the problem, and was there anything lacking in the data you had or were able to collect?
  • In what ways did you tailor the presentation to your audience? Give a specific example or two if you can.

  For assessment purposes, we looked at student responses to these questions from the second (last) project and labeled them as either "learning objective demonstrated" or "learning objective not demonstrated". In the case of "not demonstrated", we kept notes on problematic aspects – whether it was ignored, whether the choices made by the student were wrong, questionable, etc. For context, we also have the work submitted by the teams and the instructor's experience mentoring the teams and watching their interaction with the external partners (in this case, there were two audiences – a group of non-technical alumni knowing nothing about the project and a group of representatives from the industry partner).

Findings: Present and analyze your findings this year about student learning in this outcome.

   Among each of the objectives we looked at, there were several cases that were marked as "not demonstrated", partly because the student ignored the question in its entirety or in part.

   1. Subproblem identification: 29% of the essays were marked as "not demonstrated", and in most of these cases, it was because the students did not convey a good sense of which were the important big-picture items and which were more minor details. The associated work completed by the teams was largely excellent with each team appropriately subdividing the problem and attacking each part in creative ways. One student did not seem to have been engaged in any meaningful way in their team's problem formulation.

   2. Data collection: Only 10% (2 students) were marked as "not demonstrated". One of the essays seemed to be missing a big-picture sense of what the team did on this stage. The other was part of a team of three students in which the team had big problems in preparing and transforming their data so that it could be properly used with the techniques that they intended to use.

   3. Appropriate communication: 38% of the students were marked as "not demonstrated". Based on these, the problematic student work (including their team work and individual reflection) can be put into two groups denoted as A and B below. We also have another important observation, C, that applies to all students in the course.
   A) Some students were largely effective at tailoring their communication to the audience but not able to articulate what about their approach was different with different audiences or why they did it that way
   B) Some students had ineffective presentations due to upstream problems in the project lifecycle.
   C) Even though the purpose of this particular assessment round was not to assess students' visualization abilities (it is a part of effective communication and was covered in various readings and discussions in class and was an expected part of their communication with each audience), we noted that only one student commented on visualizations in their essay, and in that case, it was poorly suited for the audience they thought it would be appropriate for. This confirms a suspicion the data analytics faculty have already had that visualization needs more attention throughout the curriculum.

Actions: Discuss next steps and action items for what the department will do based upon its findings and analysis.

   The Data Analytics faculty will review these findings at one of their regular meetings during the 2018-2019 academic year and discuss appropriate actions to the curriculum or otherwise.

   For the committee that completed this review, we recommend the following:

   For all 3 items above, improvements could be made by adding checkpoints during the project where teams are required to answer strategy questions before getting deep into those respective

stages of the project. For instance, teams could be required to submit a document with initial hypotheses and their ideas for subproblem exploration within the first few weeks of the project, which might help them better organize themselves through the rest of the project.

For finding 3A, it is possible that more formal reflection on communication strategies before the actual presentation could improve their presentation even further.

For finding 3B, the issues were largely related to the team's time management and failures to properly perform modeling tasks. Being able to perform appropriate modeling tasks is something that should be investigated as part of another learning outcome in future assessment rounds.

For finding 3C, we recommend that the data analytics faculty continue deliberating on increasing attention to visualization at other points in the curriculum.

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