



PROGRAM ASSESSMENT REPORTING

2015-2016

Indiana University Kokomo

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Dr. Mary Hansen School of Sciences (Mathematics)

Learning Outcome

Briefly describe the learning outcome(s) you are reporting on for this cycle. If you have submitted a full copy of your program assessment plan to the Director of Assessment, you may use your numbering system from that document to identify the learning outcome of interest (i.e., We are reporting on learning outcome 2.4, Writing Effectively, described on page 7 of our assessment plan). You may also note specific components of learning outcomes in your description.

Goal 1. Understand the nature of truth and the concept of proof in the discipline of mathematics.
Outcome 1. Students will be able to construct and write proofs for mathematical assertions, using a variety of methods.

Assessment Date(s)

If you have previously assessed that/those learning outcome(s), when did that assessment occur, and what was your main conclusion from that assessment? What change(s) did you implement in teaching, curriculum, or other aspects of your program to address any weaknesses your assessment revealed?

This outcome was last assessed in the 2011-2012 academic year. As a result of that assessment and more recent experience teaching the post-calculus courses for math majors, we have been exploring the possibility of offering a course that could serve as an introduction to proofs course every fall. This course could be MATH-M347, Discrete Mathematics, as its topics lend themselves well to introducing a wide variety of proof techniques. Alternatively a new course could be developed. Unfortunately, given the low enrollment of upper level math courses, it has not been possible to add additional courses and M347 is offered only every other year. We have, however, rescheduled that course to be offered in fall semesters rather than spring semesters so that it comes a little sooner in the curriculum. An additional change that has been implemented since the this goal was last assessed, is that the first two weeks of M413, T336 and M403 are spent reviewing proof techniques instead of just beginning with the core material of those courses.

Method of Measurement

Briefly describe how you measured student learning on the program learning outcome(s) you noted, in this cycle. Also, describe the course(s) or setting(s) where the assessment took place. For example, quizzes/tests/exams (or selected questions on quizzes/tests/exams), written papers, or presentations from specific courses, or standardized tests given at specific points in the program, are common student artifacts that are used in learning assessment.

Student learning was measured by assessing student work in the final exams from courses at the 300- and 400- levels in which proof writing, as opposed to computation, is the main emphasis. For AY 2015-2016 the courses used for the assessment were MATH-M303, MATH-M347, MATH-M403, and MATH-

M404. For final exams from these courses each proof problem was judged by two faculty members using an ERMN rubric and the results were compared and discussed.

Student Sample

Briefly describe the student sample (i.e., sample size, typical year in college at time of enrollment) to aid interpretation.

The student sample was small because each of these courses enrolled no more than five students, most of whom are math majors, and most at the junior or senior level, although ideally students would take M303 and M347 as sophomores. In each class every student's work was assessed.

Quantitative Results

Please report the quantitative findings resulting from your data analysis. For example, you might report the percentage of students who met an acceptable level of performance, or average student performance on a particular measure, or the percentile rank achieved by a group of students in comparison to a larger pool (such as on a standardized assessment tool).

In M303 40% of students (2 students) were judged to be writing proofs with an acceptable level of proficiency, and 60% of students (3 students) were on the borderline between acceptable and unacceptable.

In M347 75% of students (3 students) were judged to be writing proofs with an acceptable level of proficiency, and 25% of students (1 student) were on the borderline between acceptable and unacceptable.

In M403 50% of students (1 student) were judged to be writing proofs with an acceptable level of proficiency, and 50% of students (1 student) were on the borderline between acceptable and unacceptable.

In M404 100% of students (2 students) were judged to be writing proofs with an acceptable level of proficiency.

Interpretation

Please state your interpretation of these findings, and your Action Plan for future improvement of student learning.

For most students M303 is one of the first courses in which students are expected to write proofs, but it is not the only focus of the course, and it was no surprise that some struggled with this aspect of the course while doing better with the computational problems.

M347 concentrates on discrete math topics and requires more proof than straight computations and the three students who met expectations all correctly wrote 6 or 7 of the proofs problems in the final exam. These students should be well prepared to tackle the more advanced work in the 400-level math courses.

The two students in M403 did not have the benefit of having previously taken M347 which is offered only every other year. The material in this course is abstract, which poses its own challenges, so I wasn't completely surprised that they didn't both achieve an acceptable level of proof writing, although

the student who failed to do so came very close. By the end of the year-long sequence M403-M404 both students showed tremendous growth in this area and nailed every proof on the final exam. Both would have been better served by having the opportunity to take an introduction to proofs course before advancing to M403-M404 (or indeed other 400-level courses).

Actions

Are there actions that IU Kokomo can take to support implementation of your Action Plan? Are there institutional challenges that your program faces that will make improvement of student learning on this outcome difficult? If so, you can describe those challenges and needs here.

The desired action plan would be to have a 300-level introduction to proofs course, with MATH-M216 as a prerequisite, to be offered every fall semester. This could be either a new course or a re-focused M347 that would concentrate even more on proof reading and writing. The challenge here is the low enrollment in the math courses beyond calculus which has thus far limited our course offerings.

Sharing

Please describe how you have shared these findings (for example, with current and prospective students, faculty, specific accrediting bodies, or other relevant parties). If you have not yet shared your findings, please describe your plan for dissemination.

This report will be forwarded to the Dean of Sciences for further dissemination.

Comments

If you have other comments about assessment to share with the Committee, please do so here.

No further comments at this time.

Consultation

Do you wish for the Director of Assessment, Dr. Julie Saam (jsaam@iuk.edu), to consult with your faculty regarding this result? That is, are you wishing for assistance at this time with your next steps?

No