

CNAS ASSESSMENT WORKSHOP

APRIL 17TH 2015 FROM 9AM – 12PM

VENUE: SBPA Lecture Hall already reserved (Booking from 8.30am-1.30pm)

THEME: TAKING MATH INVENTORY IN THE SCIENCE COURSES

PROGRAM

1. OPENING REMARKS (Dr. Yudin) (5min)
2. PRESENTATION 1: QUANTITATIVE REASONING
DATA ANALYSIS – DR. BADOWSKI (20 min)
3. PRESENTATION 2: CAPSTONE COURSES – DR.
CAMACHO (20 min)
4. BREAK (REFRESHMENT) (15 min)
5. WORKSHOP INTRODUCTION – DR. AQUINO (10 min)
6. PRESENTATION BY PROGRAMS (5 MIN each for each
program: 7 programs: CH, BI, EG, AG, CF, CS & CI, MS,
PH
7. GROUP DISCUSSIONS (60 min)
8. SUMMARY (10)
9. CLOSING (LIGHT LUNCH)

OUTCOMES

Expected Workshop Outcomes

- Interdisciplinary stock taking of math skills
- Clear linkage of math skills to the science content
- Review of pre-requisite
- Curriculum changes
- More focused assessment method

Expected Outcomes from the Presentations: QR

- Detailed analysis of raw data
- Interpretation of data
- Proposed changes to improve QR Assessment
- Identify gaps in QR and propose possible solutions
- Future of the QR assessment tool

Expected Outcomes from the Presentation: Capstone Courses

- Status of capstone in CNAS
- Why capstone
- Where we should go next
- Assessment of capstone

TO CONSIDER

1. A POST EVALUATION FOR WORKSHOP
2. A REGISTRATION REQUIREMENT

SUMMARY OF CNAS ASSESSMENT WORKSHOP 2015

Summary

The College of Natural and Applied Sciences (CNAS) hosted an Assessment Workshop on April 17, 2015, to bring interested CNAS faculty together to discuss topics related to assessment of University of Guam students' skills related to math and science courses, particularly for students enrolled in CNAS degree programs. The first part of the workshop included a presentation on the analysis of data from the Quantitative Reasoning (QR) Assessments conducted in Spring 2014, and a presentation on capstone courses, using the Biology Program's Ecology course as an example. The second part of the workshop was a moderated discussion on taking inventory of math skills and concepts needed in CNAS science courses.

Outcomes of the workshop include:

1. Presentation of the QR data analysis and comparison of UOG results with other schools nationwide, and discussion on where in the GE curriculum students should acquire QR skills;
2. Presentation on what to consider when adding a capstone course to a program's curriculum, and elements of different types of capstone courses;
3. Open dialogue between math and science faculty regarding what skills students should have prior to taking science courses, and initial steps to help reduce the gap between science faculty expectations and students' math knowledge/capabilities.

Follow-on actions: CNAS science faculty will review prerequisites for their respective courses, and math faculty will help identify areas in math courses where science content can be infused and reinforced.

Background

The CNAS Assessment Committee (CNAS-AC) Chair, Dr. Maika Vuki, first proposed an assessment workshop as a way to focus on assessment-related topics and open the discussion beyond the CNAS-AC. Taking inventory of math skills and concepts required for science courses provided a good scope for a first workshop, and could highlight areas where math and science courses could reinforce one another.

An ad hoc subcommittee of the CNAS-AC was formed to organize the workshop, and included Drs. Maika Vuki, Frank Camacho, Leslie Aquino, and Alicia Aguon. The committee met several times to refine the workshop program and discuss what information to collect from CNAS science faculty. QR Assessment and capstone courses were timely additions to the workshop, and align with G2G implementation tasks. Dr. Grazyna Badowski, who analyzed the QR assessment data while on the CNAS-AC ad hoc subcommittee on quantitative reasoning, agreed to present her results at the workshop. Dr. Frank Camacho agreed to give a presentation on

capstone courses, since he is the primary instructor for BI410: Ecology, which is the capstone course for the Biology Program.

For the math inventory, a template was created to collate responses from science faculty, and then circulated to the different science programs several weeks in advance of the workshop to give faculty time to respond. The template included a list of math skills and concepts covered in math courses from MA085 through MA205, based on syllabi and/or course catalog descriptions. Faculty could indicate which math courses are prerequisites for a sampling of science courses, which courses cover the math skills and concepts students are expected to have or know, and what types of tools (if any) students use in their courses (e.g., scientific calculator, graphing calculator, Excel, etc.). Science faculty were also asked to provide specific problems or examples of how math is used in their courses, so that math faculty could incorporate these examples into their courses. Responses were received from Agricultural Science, Consumer and Family Science, Computer Science/Computer Information Systems, Biology, Chemistry, and Physics (while not a degree program, relies heavily on math skills/concepts). During the workshop, a representative from each of the science programs gave a brief overview of the information provided in their respective templates, after which the floor was opened for discussion.

Assessment Workshop – Discussion Notes

1. Presentation 1: Quantitative Reasoning Data Analysis
 - a. Analysis of data from Spring 2014, comparison with schools nationwide
 - b. Discussion about the QR learning outcomes, and where in the GE curriculum students will gain QR skills; GERC working on mapping of Tier 1 GE to ILOs
2. Presentation 2: Capstone Courses
 - a. BI410: Ecology as capstone for Biology program; learning outcomes reinforced in capstone, not introduced
 - b. Types of content in capstones – traditional (presentations, thesis, etc.) and emerging (travel, networking, etc.);
 - c. Topics from individual programs that math instructors can use to show how a math concept/topic will be used in their future program-related courses
3. Math Inventory Workshop
 - a. Discussion points related to each program/discipline

- i. Biology: biometrics should require statistics; are math concepts in earlier bio classes reinforced?
 - ii. Agricultural Science: AG102 covers concepts like chi-squared test for genetics and other basic statistics concepts, but MA151 not a prerequisite
 - iii. Chemistry: CH102, CH103 has prereqs of MA161 or MA165, and it was noted that graphing is very central to these courses, and that calculus is already incorporated at the 100-level. CH330, CH450 involve more complex algebraic operations, multiple variables, and solving equations. Physical Chemistry requires a lot of calculus and differential equations; math content is not taught but is integral to course; perhaps review math prereqs to ensure linear algebra (MA341) and differential equations (MA301) courses are included?
 - iv. Computer Science/Computer Information Systems: Every course is related to math; for example, Java Programming covers computer graphics, and all topics incorporate logic, algebra, and geometry concepts.
 - v. Physics: Suggestion of a short refresher course to cover math concepts needed for physics; need context with concepts to ensure any such course does not become procedural
- b. General Discussion:
- i. Retention of knowledge from one course to the next; understanding and applying math concepts to take real-world info/data and distill into an equation
 - ii. What is important to science programs that can be reinforced in math courses?
 - iii. Can we cut down on math requirements? Can we enforce prerequisites so students are better equipped with math skills before upper-level science courses?
 - iv. Some students lack the basic skills and knowledge of how to succeed in each course – how to study, how to read assignments with attention to detail; how can we help students learn how to think better so they may achieve course goals, especially in lower-level courses

- v. Some problems with math skills of students may be related to issues with UOG feeder schools, and the current numbers of high school math teachers whose degrees are not in math or science. There is also a misconception that MA085 is a refresher for students; many times it is not refresher but new material.
- c. Outcomes/Actions:
 - i. Math faculty can add comments to the math inventory template to identify math courses where concepts in science courses are covered, and to see where science content can be infused into math courses.
 - ii. Almost all science programs indicated the use of a scientific calculator (or more advanced analysis tools). If a tool like a scientific calculator is needed for a course later, perhaps we should have a uniform approach to students and require earlier, such as in a course like MA110 or MA115.
 - iii. Perhaps have two basic statistics course, one for science majors and one for nonscience majors? If content is contextual, not procedural, students will get the understanding; science programs can benefit.
 - iv. Science programs to review prerequisites for courses with math concepts and content, and see if any revision is necessary.
 - d. Focused Assessment Methods:
 - i. QR tools – current one is convenient and accessible, but is no longer funded. Perhaps create our own for UOG?
 - ii. QR test being converted by TADEO to an online, Moodle-based test; can still enter data manually to compare with other colleges across nation. Would be better if test included regionally-based questions. Perhaps we can compare QR with other regional institutions?
 - iii. Can QR questions be incorporated into math placement? Would need to refine questions to also use for placement into math courses, not just for QR assessment.

Actions

- Chemistry Program to review the pre-requisite for upper division chemistry, particularly Physical Chemistry (CH450a,b) to include MA301 or MA341 or possibly physics if these topics are treated in PH courses.
- Chemistry Program to review CH330/L prerequisite to include MA151 or higher, MA387

- Math Program to consider dealing with numbers, unit conversions, solving log functions, use of graphing calculators in the MA161/5 series.
- Biology Program to review Biometrics prerequisite to include lower-level statistics courses
- Science programs to review courses with math content and determine if listed prerequisites are still sufficient, or need revision.
- Math Program to help identify areas in math courses where science content can be infused.

Acknowledgments

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