GES3 Solve problems using quantitative reasoning.

MATH1000 – Algebra for College Students

Semester: FALL 2013

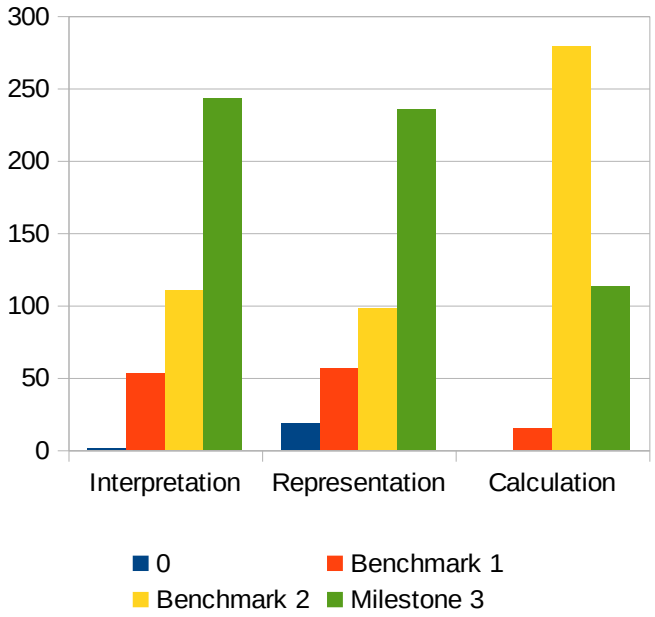
REPORT DATE: 1/13/2014

Algebra for College student is an introductory level algebra course that is the pre-requisite course for Pre-Calculus, Calculus I, etc., the mathematics series serving STEM programs and other higher level math requiring programs such as business, economics, etc. QR assessment was composed of selected questions given on the common final exam that were scored using the AAC&U Quantitative Literacy Value Rubric.

Number of students:
811 enrolled
407 assessed

Number of sections:
38 registered
21 assessed

Distribution of Scores



Mean scores overall:

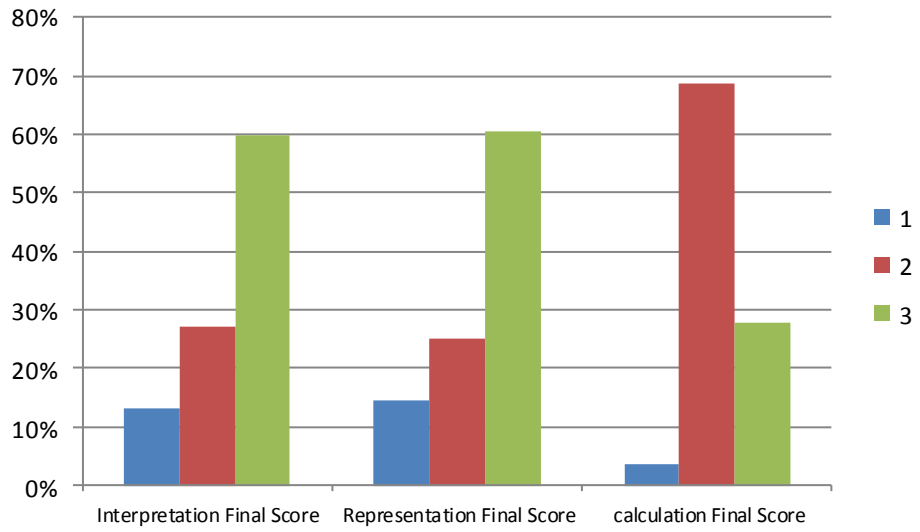
Criteria	Mean
Interpretation	2.4619
Representation	2.3514
Calculation	2.2408
Analysis	NA
Assumptions	NA
Communication	NA

	Interpretation	Representation	Calculation
0	1	18	0
Benchmark 1	53	56	15
Benchmark 2	110	98	279
Milestone 3	243	235	113
Total	407	407	407

Percentages of score

	Interpretation Final Score	Representation Final Score	Calculation Final Score
1	13%	14%	4%
2	27%	25%	69%
3	60%	60%	28%

Passing rate: level 3



Discussion/Action/Closing the Loop:

Background

Math1000, Algebra for College Students, is an introductory level algebra course that is the pre-requisite course for Pre-Calculus, and the Calculus series serving STEM programs and other higher level math requiring programs such as business, economics, etc. This course may be partially affected by the incorrect placement of students[1]. Additionally, nearly half (43% in fall 2013) of incoming first time full time freshmen at Kean are African American and/or Latino students[2]. Janellen's NJ Public Education Report[3] indicated that there is a wide gap in 8th grade between students of color and their white

1 Students in non-STEM programs etc are often required to take Math1000. The appropriateness and value of Math1000 for non-STEM programs needs to be reevaluated.

2 IR Profile: http://ir.kean.edu/irhome/Student/StuProfile/Student.asp?EDR=E&StuGrp=FR&Category=Eth

3 The State of New Jersey Public Education Report, Janellen Duffy, 2013 http://www.jerseycan.org/sites/jerseycan.org/files/research/reports/SoE2013/index.html

classmates in their mathematics skills. It is possible African American and Latino students at Kean are still struggling with their math courses. Math1000 is therefore heavily dependent on the learning outcomes of Math0901, the developmental course for students who are placed below college level math based on their Elementary Algebra Accuplacer® scores. Math1000 is a traditionally taught algebra course, where procedural fluency and calculation using traditional exercises is emphasized to provide students with the basic tools to succeed in the Calculus sequence.

Results Interpretation

The Quantitative Reasoning assessment was composed of selected questions given on the common final exam that were scored using the AAC&U Quantitative Literacy Value Rubric. The numbers of questions selected for interpretation, representation and calculation are 5, 5 and 15.

Students performed better on interpretation and representation rather than calculation. While 60% of Math1000 students met the expectation (level 3) on Interpretation and representation (60%), only 28% reached the passing line on calculation. This result is not surprising given the algebraic weaknesses that our students enter the university with. In order to improve student outcomes in Math1000 we need to focus on the following.

1. The institution has suggested that the Math department create Math0902 – a developmental math course for those who will be pursuing STEM subjects and will therefore need to proceed to Math1000. We will be working on this course in Spring 2014.

2. For the time being, coordinate and communicate with the GE department on ensuring Math1000 readiness of students who succeed in Math0901.

3. Coordinate and communicate with other (non-calculus sequence) programs in the university which require Math1000 to make sure that this course is an appropriate mathematics course for their students.

4. Study our current Math1000 curriculum and the respective mathematics education research to see what models for successful algebraic development could enhance algebra learning at Kean.

5. Continue to develop economical and effective means of communication and curriculum/pedagogy dispersion to our adjunct faculty to ensure uniformity of learning opportunities in all sections of the course.

Other Future Considerations

Develop/Initiate multiple longitudinal study(s) of student performance to answer the following questions:

- Do students who succeed (pass) Math0901 succeed in Math1000 (pass)?
- Do students who succeed in Math1000 (pass) succeed in Math1054 (or other higher level math courses)?
- What do students who succeed (pass) in Math0901 learn? (What skills and/or conceptual understanding do they have that those who do not pass do not have?)
- What do students who succeed (pass) Math1000 know or can do at the beginning of Math1000 that other students who fail do not? (What skills and/or conceptual understanding do they have that those who do not pass do not have?)
- Do our Accuplacer® cut scores function appropriately?

Quantitative Literacy VALUE Rubric

for more information, please contact value@aacu.org

Association of American Colleges and Universities

Definition

Quantitative Literacy (QL) – also known as Numeracy or Quantitative Reasoning (QR) – is a "habit of mind," competency, and comfort in working with numerical data. Individuals with strong QL skills possess the ability to reason and solve quantitative problems from a wide array of authentic contexts and everyday life situations. They understand and can create sophisticated arguments supported by quantitative evidence and they can clearly communicate those arguments in a variety of formats (using words, tables, graphs, mathematical equations, etc., as appropriate).

Evaluators are encouraged to assign a zero to any work sample or collection of work that does not meet benchmark (cell one) level performance.

	Capstone	Milestones		
	4	3	2	1
Interpretation *Ability to explain information presented in mathematical forms (e.g., equations, graphs, diagrams, tables, words).*	Provides accurate explanations of information presented in mathematical forms. Makes appropriate inferences based on that information. *For example, accurately explain the trend data shown in a graph and make reasonable predictions regarding what the data suggest about future events.*	Provides accurate explanations of information presented in mathematical forms. *For instance, accurately explain the trend data shown in a graph.*	Provides somewhat accurate explanations of information presented in mathematical forms, but occasionally makes minor errors related to computations or units. *For instance, accurately explain trend data shown in a graph, but may miscalculate the slope of the trend line.*	Attempts to explain information presented in mathematical forms, but draws incorrect conclusions about what the information means. *For example, attempt to explain the trend data shown in a graph, but will frequently misinterpret the nature of that trend, perhaps by confusing positive and negative trends.*
Representation *Ability to convert relevant information into various mathematical forms (e.g., equations, graphs, diagrams, tables, words).*	Skillfully converts relevant information into an insightful mathematical portrayal in a way that contributes to a further or deeper understanding.	Competently converts relevant information into an appropriate and desired mathematical portrayal.	Completes conversion of information but resulting mathematical portrayal is only partially appropriate or accurate.	Completes conversion of information but resulting mathematical portrayal is inappropriate or inaccurate.
Calculation	Calculations attempted are essentially all successful and sufficiently comprehensive to solve the problem. Calculations are also presented elegantly (clearly, concisely, etc.)	Calculations attempted are essentially all successful and sufficiently comprehensive to solve the problem.	Calculations attempted are either unsuccessful or represent only a portion of the calculations required to comprehensively solve the problem.	Calculations are attempted but are both unsuccessful and are not comprehensive.
Application / Analysis *Ability to make judgments and draw appropriate conclusions based on the quantitative analysis of data, while recognizing the limits of this analysis.*	Uses the quantitative analysis of data as the basis for deep and thoughtful judgments, drawing insightful, carefully qualified conclusions from this work.	Uses the quantitative analysis of data as the basis for competent judgments, drawing reasonable and appropriately qualified conclusions from this work.	Uses the quantitative analysis of data as the basis for workmanlike (without inspiration or nuance, ordinary) judgments, drawing plausible conclusions from this work.	Uses the quantitative analysis of data as the basis for tentative, basic judgments, although is hesitant or uncertain about drawing conclusions from this work.
Assumptions *Ability to make and evaluate important assumptions in estimation, modeling, and data analysis.*	Explicitly describes assumptions and provides compelling rationale for why each assumption is appropriate. Shows awareness that confidence in final conclusions is limited by the accuracy of the assumptions.	Explicitly describes assumptions and provides compelling rationale for why assumptions are appropriate.	Explicitly describes assumptions.	Attempts to describe assumptions.
Communication *Expressing quantitative evidence in support of the argument or purpose of the work (in terms of what evidence is used and how it is formatted, presented, and contextualized).*	Uses quantitative information in connection with the argument or purpose of the work, presents it in an effective format, and explicates it with consistently high quality.	Uses quantitative information in connection with the argument or purpose of the work, though data may be presented in a less than completely effective format or some parts of the explication may be uneven.	Uses quantitative information, but does not effectively connect it to the argument or purpose of the work.	Presents an argument for which quantitative evidence is pertinent, but does not provide adequate explicit numerical support. (May use quasi-quantitative words such as "many," "few," "increasing," "small," and the like in place of actual quantities.)