General Education Report

Quantitative Literacy

August 21, 2020

Summary

The Department of Economics within the College of Arts and Sciences supports three degree programs at Howard University. In addition to one undergraduate and two graduate degrees, they offer several undergraduate courses that serve the larger Howard student body. These courses provide the University with opportunities for undergraduate students to explore Quantitative Literacy among other general education outcomes.

Context

Howard University General Education 21 (HUGE 21) is a set of 21 general education learning outcomes decided by faculty in 2017. The outcomes are met through curricular and co-curricular student experiences including classes and coursework, high-impact learning opportunities, student activities, employment, and alternative experiences. Each semester, Howard University looks at student work or data related to students experiences and determines the degree to which students have met one or more of these outcomes.

Outcomes are measured on a rotating basis across all undergraduate schools and colleges. Of the 21 outcomes, 5 (Critical Thinking and Problem Solving, Written Communication, Oral Communication, Quantitative Literacy, Information Literacy, and African Diaspora Awareness) are measured every other year, and the other 15 (Creative Thinking, Ethical Reasoning, Inquiry and Analysis, Qualitative Literacy, Technology, Arts and Humanities, Social Sciences and Historical Awareness, Intercultural Knowledge and Foreign Language Competency, Science and Environmental Consciousness, Physical and Mental health, Teamwork, Entrepreneurship and Financial Literacy, Civic Knowledge and Engagement, Foundation and Skills for Life-Long Learning, and Integrative and Applied Learning) are assessed at least once each 7-year cycle.

In instances where the outcome is measured by extant data, the Office of Institutional Research and Assessment (IRA) partners with a department, faculty member, or staff member to analyze data and report on a chosen general education outcome. In other cases, IRA partners with programs and units to identify how to capture data related to a chosen outcome.

In order to measure "Quantitative Literacy," IRA requested extant data from the Economics Department in the College of Arts and Sciences.

Quantitative Literacy
According to HUGE 21, the Quantitative Literacy outcome will be met if

> A Howard graduate will read and interpret graphs and statistics, understand the relationships described in equations appropriate to his or her discipline, write some equations that accurately describe relations relevant to his or her discipline and perform accurate and pertinent computations to simplify equations or derive quantitative answers.

As early as the 1990s quantitative literacy was identified as a skill which "can be expected to be essential in enhancing employment choices" (Rivera-Batiz, 1992, p. 314). As many employers connect quantitative literacy to efficiency and productivity, those who can demonstrate achievement in this area are more likely to have sustainable employment. While many connect quantitative literacy directly to "a person's understanding of mathematics, his or her beliefs about mathematics, and his or her disposition toward mathematics," we looked beyond the mathematics classroom to identify places where the introduction and development of quantitative literacy skills was occurring (Wilkins, 2010, p. 267). Whether using a vocabulary rooted in mathematical principles or using critical thinking techniques that are foundationally exercises in quantitative problem solving, the discipline of economics offers an opportunity outside of the mathematics department to see assess the competence of students in regards to quantitative literacy.

Artifacts

The Department of Economics serves undergraduate students throughout the University through several open enrollment courses. The majority of non-major students in economics classes are either enrolled in ECON 001 (Principles of Economics I) or ECON 002 (Principles of Economics II).

According to the syllabus, ECON 001 or Principles of Economics I, "the purpose of this course is to introduce the student to the basic principles of macroeconomic theory and policy."

Upon successful completion of the course, students should become familiar and comfortable with:

- The methods of thought and tools which facilitate economic analysis.
- The historical and contemporary facts of the economy at the macro-level, such as the history of the business cycle, inflation, productivity, economic growth, income distribution, and structural change.
- The most important institutions of the economy such as the household sector, the business sector, the financial system, the tax system, and the federal budget.
- The economic relationships used in macroeconomic theory such as the consumption function, the investment function, the aggregate expenditure function, the aggregate demand function, and the aggregate supply function.
- The concept of macroeconomic equilibrium and disequilibrium
- Alternative theoretical models of macroeconomic behavior such as the classical model, the Keynesian model, and the monetarist model.
- Important historical episodes of macroeconomic policy application such as the Great Depression of the 1930s, wage and price controls during World War II, the Kennedy tax cut of the 1960s, the oil price inflation of the 1970s, "Reaganomics" of the 1980s, the Clinton economic program of the 1990s, and the Great Recession of the late 2000s.

- The demographic components of macroeconomic statistics such as unemployment, wages, etc. to be in line with the following principles Critical Thinking, Information Literacy, and African Diaspora Awareness

According to the syllabus, ECON 002 or Principles of Economics II, or microeconomics, the course is " concerned with understanding the consumer behavior, the determination of firms' inputs, outputs, costs, and revenues, and how prices are determined for different products."

Students completing the course should be able to have knowledge of the following:

- The principles and tools which facilitate economic analysis.
- The cause-and-effect relationships which influence the choices (and the effects of the choices) of individuals, business and society.
- The relationships between scarcity, economic value, and price.
- The operation of the market system and price mechanism.
- The determination of output and price under different market structures.
- The economics of social welfare.

The courses are designed as lecture-based courses. Student competency is assessed in a variety of ways including online assignments/quizzes, reports, exercises, and exams. The course contains both a midterm and a final exam.

Methodology

In the spring of 2019, the Office of Institutional Research and Assessment met with the Chair of the Department of Economics to discuss capturing information on students in Economics courses. Together, we discussed several courses that were "outward-facing" courses, serving many non-major students. Two of these courses (ECON 001 and ECON 002) were often used by undergraduate students to meet core curriculum requirements. The department provided a syllabus for each designated course and the final exam scores for 001 and 002 as taught in Spring 2019. Looking at final grades, we determined the degree to which the students were meeting the competencies of the course and overall competency of Quantitative Literacy.

Student grades for the spring semester ranged from 20% to 100% on a 100-point scale. The Department of Economics explained that some lower grades were common, and the exams, purposefully challenging, were often curved before being calculated as part of the final course grade. Reflecting on this, IRA separated the scores into four competency levels:

Developing	Students scored between 0% and 39%
Target	Students scored between 40% and 69%
Exceptional	Students scored between 70% and 100%

Results

In Spring 2019, 331 students took the ECON 001 final exam and 226 students took the ECON 002 final exam. Three exam forms were given: A, B, and a make-up (MU) form for students who missed the original testing date. The total possible points for each exam was 100.

The table below shows the distribution of assessment designations.

Designation	ECON 001	%	ECON 002	%	Grand Total	%
Developing	30	9.06%	26	11.50%	56	10.05%
Target	246	74.32%	136	60.18%	382	68.58%
Exceptional	55	16.62%	64	28.32%	119	21.36%
Grand Total	**331**	100.00%	**226**	100.00%	**557**	100.00%

Though two different exams were used for each course (A and B), there were not significant differences between the forms regarding the percentages of students scoring in the different designations. The following table shows the percentage of students meeting each designation based on exam form.

Designation	A	B	MU	Grand Total
Developing	10%	11%	8%	10%
Target	68%	68%	77%	69%
Exceptional	22%	21%	15%	21%
Grand Total	**100%**	**100%**	**100%**	**100%**

For ECON 001, 90.94% of students earned a “Target” or “Exceptional” designation. For ECON 002, 88.50% of students earned a “Target” or “Exceptional” designation.

Implications

While the final exam for each class only counts for 30% of the students’ final grades in ECON 001 and ECON 002, its comprehensive nature helps to assess student competencies in the content and skills covered. The data suggest that students are successfully comprehending microeconomic and macroeconomic principles. A highly competitive major at Howard University, the rigor and high expectations of these service courses are not surprising. While quantitative literacy can be evaluated in a variety of ways, it is important that the University uncovers this general education outcome in multiple ways and in multiple fields.

Suggested Improvements

Economics courses are complex in that they cover multiple general education outcomes at once. Critical Thinking and Problem Solving, Ethical Reasoning, Inquiry and Analysis, Written Communication, and Quantitative Literacy are just some of the outcomes that can be assessed within economics courses. Future attempts at assessing one or many of these within the field of economics should focus on specific question or micro assignments that more accurately indicate student competency in these areas.

An important contributor to a well-rounded and liberal education for all Howard students, the Department of Economics should be engaged earlier to design and deploy more curated assignments that may guide better understanding of student learning outcome attainment. As a pilot, this study has helped Institutional Research and Assessment better position themselves to advocate for stabile and sustainable signature assignments that clearly identify student achievement in a chosen outcome.

References

Rivera-Batiz, F. L. (1992). Quantitative literacy and the likelihood of employment among young adults in the United States. *Journal of Human Resources 27*(2), 313-328.

Wilkins, J. L. (2010). Modeling quantitative literacy. *Educational and Psychological Measurement, 70*(2), 267-290.