General Education Competency Assessment Report for Blue Ridge Community College 2023-2024: Scientific Literacy and Quantitative Literacy

This assessment report is to fulfill the State Council for Higher Education in Virginia's Policy on Student Learning Assessment and Quality in Undergraduate Education.

General Education Philosophy at BRCC

Blue Ridge Community College's general education offerings intentionally strive to develop a liberal arts perspective. The program exposes students to a broad body of knowledge of the major social, cultural, historical, and scientific forces that have shaped human identity and the world. General education enables students to integrate knowledge to address fundamental questions about the nature of the world and its inhabitants. Blue Ridge Community College believes general education is an important component for all students whether they are going immediately into the workforce or continuing their education.

As a part of the VCCS, Blue Ridge Community College adheres to the VCCS General Education Policy in selecting and defining general education competencies. The General Education Policy states that "upon completion of the associate degree, graduates of Virginia's Community Colleges will demonstrate competency in student learning outcomes (SLOs) determined and assessed by each college in 1) civic engagement, 2) critical thinking, 3) professional readiness, 4) quantitative literacy, 5) scientific literacy, and 6) written communication." (p. 1). The competencies are defined as follows:

Civic Engagement is the ability to contribute to the civic life and well-being of local, national, and global communities as both a social responsibility and a life-long learning process. Degree graduates will demonstrate the knowledge and civic values necessary to become informed and contributing participants in a democratic society.

Critical Thinking is the ability to use information, ideas, and arguments from relevant perspectives to make sense of complex issues and solve problems. Degree graduates will locate, evaluate, interpret, and combine information to reach well-reasoned conclusions or solutions.

Professional Readiness is the ability to work well with others and display situationally and culturally appropriate demeanor and behavior. Degree graduates will demonstrate skills important for successful transition into the workplace and pursuit of further education.

Quantitative Literacy is the ability to perform accurate calculations, interpret quantitative information, apply and analyze relevant numerical data, and use results to support conclusions. Degree graduates will calculate, interpret, and use numerical and quantitative information in a variety of settings.

Scientific Literacy is the ability to apply the scientific method and related concepts and principles to make informed decisions and engage with issues related to the natural, physical, and social world. Degree graduates will recognize and know how to use the scientific method, and to evaluate empirical information.

Written Communication is the ability to develop, convey, and exchange ideas in writing, as appropriate to a given context and audience. Degree graduates will express themselves effectively in a variety of written forms.

Furthermore, BRCC complies with the VCCS General Education Policy by assessing each of the six competency areas outlined above in accordance with SACSCOC accreditation standards and SCHEV policy.

General Education Assessment

The approach to assessment at BRCC is based on the idea that no single instrument or process captures the breadth and depth of general education, and that a robust assessment plan contains multiple strategies. We use direct course-embedded measures of student work through processes within our career/technical and transfer program coursework. We also administer standardized direct assessments of general education to graduating students and/or use indirect measures such as surveys and participation, depending on the competency. Our assessment process considers four components:

General education outcomes in major content coursework

All associate degree programs have a general education core defined by distribution requirements. The general education coursework core of the Associate of Applied Science (AAS) degrees is small in proportion to the major coursework. AAS programs such as Nursing, Veterinary Technology, Business, and Aviation are roughly proportioned at 15 credits general education to 45 credits major coursework. While the introductory level courses in composition, math/science, humanities, and social science provide the fundamentals, the important information for program improvement is to know how students perform in key general education outcomes within the context of their major coursework. Are nursing students writing well in their nursing coursework, following the conventions of their discipline? How does critical thinking factor into the decision-making process in business? Questions like these are addressed by this piece of the package.

For our career/technical (AAS) programs, we ask each year that as part of the program's overall general education assessment strategy, they perform a course-embedded assessment of a designated competency for that year. **For this report, all AAS program heads were asked to identify a program course for 2023-24 in which they would assess the Scientific Literacy competency using student work in that course**.

General education outcomes in general education coursework

The Associate of Arts and Sciences (AA&S) and Associate of Science (AS) awards are transfer oriented and have a general education core of 30 or more credits. Students in these programs may be in any of several hundred courses fulfilling either general education or transfer elective requirements, and the courses themselves will have a mix of AA&S, AS, and AAS students enrolled. A system centered on coursework in the major didn't make sense here, so we instead used the distribution requirements as general education "clusters" with associated outcomes – an idea we picked up from our neighbors at JMU.

The cluster areas for assessment purposes are (1) English composition and literature, (2) fine arts and humanities, (3) mathematics, (4) science, and (5) history and social sciences.

Each cluster area is assigned a faculty leader who is responsible for coordinating the assessment of general education competencies in courses in their cluster. Each cluster lead works with faculty teaching designated courses each year to determine an appropriate artifact for assessment that demonstrates at least some of the outcomes associated with that cluster.

Cluster leads and the faculty General Education Assessment Coordinator form the assessment team and score artifacts across all clusters. AAC&U style rubrics for each outcome have been developed and are written broadly enough to be applicable to various works. As part of the scoring process, the group notes strengths and weaknesses and possibilities for improving student performance. The cluster leads share the initial assessment reports with the course faculty and ask them to pick one thing to work on for the following year and produce an action plan. Action plans have included revising existing assignments, creating new assignments to better align with outcomes, and creating new course activities to better support assignments.

In the following year, the courses go through a second round of assessment to see if changes in student performance have occurred after the action plan has been implemented. A comparable selection of student work is taken for scoring, and at the end of the process, the course faculty receive a detailed report of the whole two-year process from start to finish.

There is no set schedule for assessing each competency at the general education course level. We assess multiple competencies each year in various general education courses. This doesn't mesh well with the common scheme of designating a competency every year to *assess*, but we've worked around that: each year, we have a designated competency to *report on*, and we'll usually report on the past several years of cluster-related activities surrounding that competency. **This year, we will report on Scientific Literacy activities taking place within the General Education clusters from 2020-21 through 2023-24.**

Institutional level assessment with external benchmarks

Course-embedded assessment in our general education and major content courses is a way of gathering information that is meaningful and actionable for faculty. We added these processes to our assessment package to address a weakness that is inherent in standardized graduation assessments of general education: well-designed summative assessments of general education are written in a way that performance should not be dependent on a particular course. This makes sense as a broad measure of what students can demonstrate by the end of a program, but it's not particularly helpful when you are asking faculty to make use of assessment data to inform strategies for improvement. These instruments don't provide information at that level.

They do have a use however, which is why we opted to supplement them with other measures instead of replacing them when the VCCS schedule of assessments was discontinued. Course-embedded assessment does not provide external benchmarks – faculty end up comparing student performance to benchmarks they set themselves, and it's not surprising that those benchmarks are frequently "met." Standardized assessments give us benchmarks outside ourselves to compare and the results of these graduation assessments can alert us if something is seriously off at the program level. **Each year, graduating students are required to complete an assessment; for 2023-24, the competency was Quantitative Literacy, and the instrument was the *Quantitative Reasoning Test, Version 9* from Madison Assessment**.

Assessment schedule

BRCC will assess the general education competencies on a three-year cycle, reporting on two competencies per year. One of those will be the institutional-level graduation assessment, and for each of these, we have designated the instrument. The other competency will be assessed using the course-embedded approaches described above. Career/technical programs will contribute to the assessment of the themed competency for that year, and summary reports will be provided for the recent activity of the general education clusters in that area.

Instruments:

- Written Communication: *IntelliMetric Written Communication Assessment – Writing Response Test*, McCann
- Civic Engagement: *Personal and Social Responsibility Inventory* (PSRI), Iowa State University
- Quantitative and Scientific Literacy: *Quantitative Reasoning Test* (QR) and *Scientific Reasoning Test* (SR), Madison Assessment
- Critical Thinking: *Test of Everyday Reasoning* (TER), Insight Assessment
- Professional Readiness: Global Perspectives Inventory (GPI), Iowa State University

	Cycle 1			Cycle 2		
Competency	**2019-2020**	**2020-2021**	**2021-2022**	**2022-2023**	**2023-2024**	**2024-2025**
Written Communication	Embedded			Graduates (McCann)		
Civic Engagement	Graduates (PSRI)			Embedded		
Quantitative Literacy		Embedded			Graduates (QR)	
Scientific Literacy		Graduates (SR)			Embedded	
Professional Readiness			Embedded			Graduates (GPI)
Critical Thinking			Graduates (TER)			Embedded

Competency: Scientific Literacy

Scientific Literacy is the ability to apply the scientific method and related concepts and principles to make informed decisions and engage with issues related to the natural, physical, and social world. Degree graduates will recognize and know how to use the scientific method, and to evaluate empirical information.

- **SL1:** Distinguish scientific information from non-scientific information
- **SL2:** Apply scientific methodology to analyze data and draw conclusions supported by the data
- **SL3:** Propose one or more solutions that demonstrate comprehension of a problem

The assessment rubrics for each outcome are included in Appendix A. Outcomes and rubrics were chosen, developed, and approved by faculty across all disciplines as part of a year-long process, and continue to be revised and updated. Rubric statements are modeled after the AAC&U Civic Engagement VALUE Rubric and borrow heavily from that source but have been significantly modified to better align with our assessment structure.

Scientific Literacy within general education coursework

For this piece, we aggregate results over the multi-year period leading up to the report. This gives a larger institutional view of the average across of many courses in many disciplines taught at various levels. To obtain a high level of faculty participation and to generate honest and open discussion with faculty about their assignment and course strategies, we have promised a level of anonymity in public-facing reporting. While course faculty are provided with precise scores and detailed feedback, we generally do not separate scores for individual courses. However, since the SL outcome statements have some overlap with Critical Thinking and Quantitative Literacy, they are only being picked up by the lab science courses.

> ***2 courses** chose at least one Scientific Literacy outcome to assess: CHM 111 and GOL 105*
>
> *Over a four-year period, **212 student works** were scored for this competency.*

We highlight the ongoing work of CHM 111 faculty to try to improve outcomes for students who complete this course as a major requirement. Instructors chose a representative lab quiz where students were asked to determine a chemical formula from experimental measurements (Quantitative Literacy). After obtaining the formula, they were asked why they perform a procedure in a particular way and need to reason through how making a measurement error in one spot would affect the determined formula (Scientific Literacy, specifically *SL3: Propose one or more solutions that indicate comprehension of a problem*).

Students struggled with both outcomes. Actions taken included (1) faculty requiring students to show them their data before leaving the lab and require them to dry the copper more if necessary (2) faculty providing students with a pre-lab assignment and supplemental practice in lecture on how to find formulas when the mole ratios are not whole numbers. Course faculty made additional revisions to the lab layout, including shifting the “mass of chlorine” calculation to the table up front that the lab instructor signs off on.

And, after two years of follow-up and tweaking the lab…the numbers never really budged. The lead instructor reported there has been an improvement in students being able to articulate what the purpose of the lab is (and understanding that they actually need to read the lab before they come in). However, there are many who do not understand what they are doing even with more practice and more discussion. This is an important point: *not every intervention is guaranteed to produce results, and that's OK*. In this particular case, the instructor that this lab is early in the semester, and that students do become more proficient in their ability to explain and solve problems as the semester progresses.

Aggregated results for Scientific Literacy within General Education coursework

SL1: 2020-21 through 2023-24 (no data for this cycle)

SL1 (*Distinguish scientific information from non-scientific information*) was not picked up by any General Education courses selected in this cycle. It has been used previously within the social sciences and is also a focus in clinical programs such as Nursing.

SL2: 2020-21 through 2023-24

SL2 (*Apply scientific methodology to analyze data and draw conclusions supported by the data*) was unproblematic in the course/artifact pair we sampled. There were 498 scores with mean score of M=2.1 (SD = 1.2) and score distribution: 0 (18%), 1 (6%), 2 (22%), 3 (54%).

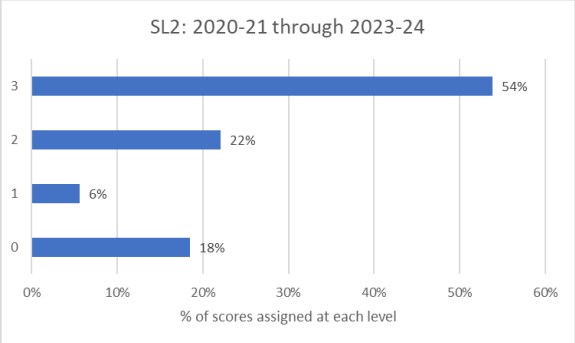


Figure 1: Aggregated SL2 scores (20-21 through 23-24)

SL3: 2020-21 through 2023-24

The assessment team determined that the artifact we were considered for SL3 (*Propose one or more solutions that demonstrate comprehension of a problem*) topped out at level (2). A score of (3) would indicate students had a deep comprehension of a complex problem, and in this introductory course, the assignment they were completing was straightforward. There were 388 scores with mean score of M=1.3 (SD = 0.6) and score distribution: 0 (6%), 1 (61%), 2 (32%), 3 (0%).

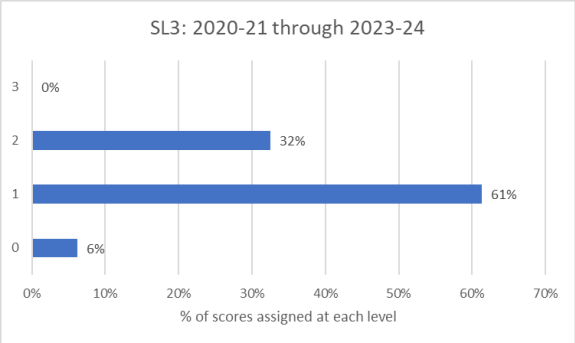


Figure 2: Aggregated SL3 scores (20-21 through 23-24)

Scientific Literacy within Career/Technical (CTE) programs

For the course embedded assessment of Scientific Literacy within the CTE programs, we asked faculty to identify a course and assignment to assess *at least one* of SL1, SL2, or SL3 in student work using the lens of the Scientific Literacy rubrics (see Appendix A). Contributions included:

- Criminal Justice: Students will assess multiple quantitative studies from peer-reviewed academic journals. This process involves utilizing knowledge gained from module 2, "Social Science and the Scientific Process." The students will
    - Assess the scientific method used by the researchers to determine whether the study was either quantitative or qualitative.
    - Determine the process for Institutional Review Board (IRB) approval to test human subjects.
    - Determine whether sound scientific principles were used to make conclusions about a population using a sample of the respondents.
    - Make a distinction in each article of correlation versus causation when examining the results. [SL1: *Distinguish scientific information from non-scientific information*]
- Accounting: Students will complete a financial analysis project. The students will use multiple data sources to triangulate data and substantiate their findings as to the profitability, solvency, and ability of the company to function as a going concern. [SL2: *Apply scientific methodology to analyze data and draw conclusions supported by the data*]
- Aviation: Students will complete a proper Pitot/Static altitude/altimeter test project that will require them to identify the correct procedures, verify data instrumentation, system interconnects, and provide results. Students will communicate issues found and evaluate and assess their results based on FAA Regulations CFR 91.411, CFR 91.413, CFR Part 43, and manufacture data. [SL3: *Propose one or more solutions that demonstrate comprehension of a problem*]
- Emergency Medical Services: Students will analyze peer-reviewed scientific literature to further understand a topic of their choice involving cardiopulmonary resuscitation. Students will need to differentiate between true scientific/medical information and otherwise to develop a best-practice. [SL1]
- Human Services: Students will complete a research paper on a therapeutic therapy of their choice. They will provide information on the origins, key concepts, and application of chosen therapy modality. They will critically analyze research on the theory along with its strengths and limitations. I will look to see if their discussions and conclusions are supported by the research. [SL2]
- Computer and Electronics Technology: Students complete a final Troubleshooting lab where for each of 10 situations (like "No internet connection or Local only" they must give at least two options of a possible procedure at finding a solution. Students are directed to list the simple things first but can add any other steps that they feel that may help find the solution. [SL3]

Program faculty are very satisfied with student performance

Table 1: Scientific Literacy score summary

SL summary scores (all components)		
Score	**Number**	**%**
4	33	24%
3	35	25%
2	12	9%
1	58	42%
0	0	0

A score of "2" indicates uneven performance but an overall impression of competence. A score of "3" indicates satisfactory or better performance on every component of the underlying scoring tool in use by the instructor.

Due to the varied nature of the programs, the level of the course chosen, and the complexity of the assignment within the course, there is no value in using the data to compare programs to each other. The intent is that, looking at many students across many programs, we get a picture not only of student competency, but also the extent to which program faculty view their students as sufficiently prepared to function in a professional setting. Very few student works scored as completely lacking in proficiency. Many of the courses the student work is pulled from come at the end of the program plan, weaker students have not made it to this point, and students in these classes should be high-performing. Many instructors indicated that in terms of class expectations, a score of 2 would not be considered satisfactory, and they would expect their students to be proficient (3) to exemplary (4) at the task.

Discussion of results

We are getting a much better discussion of results with the use of the Google form we implemented last year. In addition to entering score date, instructors are prompted to address the following:

- Think back about when you were grading your students' work. Did you notice any themes?
- Name one thing you saw that they were particularly good at across the board.
- Can you name one thing that they seemed to have trouble with?
- Was there anything that jumped out that even the good students seemed a little weak on?
- For the weaker students, what sorts of things tripped them up that you gave a lower score?
- Did anything surprise you?
- Name one thing you could do to support your weaker students and help them address the performance issues you noted above.

Here are some of those observations:

Name one thing you saw that they were particularly good at across the board.

- The willingness among students to embrace that some research is better than others. To understand that everything they read online isn't sound scientific research.
- Using evidence-based practices to identify the best method for doing something.
- The majority of students were able to identify strengths of the theoretical perspective they had chosen to complete their paper on.

Can you name one thing that they seemed to have trouble with?

- Understanding how to access scholarly materials, and to be able to recognize peer reviewed research.
- Using appropriate studies to support their points.

- Distinguishing between field wiring concepts and loop wiring concepts [while troubleshooting].

Was there anything that jumped out that even the good students seemed a little weak on?

- Even the one student who had a firm grasp of the scientific method didn't understand how it could be applied to a social science environment. He understood the hard sciences approach, such as chemistry and biology, but seemed surprised that the same methods were used in criminology and psychology.

Name one thing you could do to support your weaker students and help them address the performance issues you noted above.

- It would be beneficial if we walked through our own scientific study, albeit rudimentary, it would give them some practical experience in the scientific method.
- Review study limitations prior to them starting the project.
- I plan to break down future research papers into steps (i.e. identify topic, literature review, paper outline, first draft and final draft) that can be reviewed at each step, in order to make sure students have the appropriate level support and knowledge.
- I plan to have a practice troubleshooting lab to help them step through the process.
- In the assignment instructions, I will emphasize the need to reference a principle from the code to support their answer. I will also create a micro lecture to provide students with more knowledge of how to use the NAEYC Code of Ethical Conduct in a practical way in the classroom. This was a reminder that not all of my students have experience in the field and they may not have had experience with handling ethical dilemmas.

Competency: Quantitative Literacy (2023-24 Graduation Assessment)

Quantitative Literacy is the ability to perform accurate calculations, interpret quantitative information, apply and analyze relevant numerical data, and use results to support conclusions. Degree graduates will calculate, interpret, and use numerical and quantitative information in a variety of settings.

Instrument: Quantitative Reasoning Test (QR) (Madison Assessment)

The Quantitative Reasoning Test, Version 9 (QR-9) is a 26-item multiple-choice test developed by science and mathematics faculty, designed to assess the quantitative reasoning skills that students may obtain through a general education curriculum. In addition to the total test being focused on Quantitative Reasoning, there are also two subset objectives:

> **Use of graphical, symbolic, and numerical methods to analyze, organize, and interpret natural phenomena.** (21 questions, 2-13, 18-26)
>
> **Discriminate between association and causation, and identify the types of evidence used to establish causation.** (10 questions, 1, 14-17, 20, 23-26).

(Madison Assessment. (2013) *Manual QR 2013*.)

Some QR questions overlapped between the two subset objectives. These objectives also overlap with the current Quantitative Literacy outcomes (current version established in 22-23) as seen below:

Table 2 – Quantitative Literacy Outcomes Map

Current BRCC QL Outcomes	QR-9 Outcomes
QL1: Perform accurate calculations and symbolic manipulation **QL2**: Interpret mathematical models such as functions, graphs, tables and schematics and draw inferences from them **QL3**: Represent mathematical information numerically, symbolically, and visually	Use of graphical, symbolic, and numerical methods to analyze, organize, and interpret natural phenomena.
QL2: Interpret mathematical models such as functions, graphs, tables and schematics and draw inferences from them **QL4**: Apply mathematical reasoning and techniques in discipline specific ways	Discriminate between association and causation, and identify the types of evidence used to establish causation.

There are multiple benchmarks that will be considered with looking at the assessment data:

> The overall results of the 2016-17 administration of the QR assessment at BRCC, which had a mean score of **14.3** (55%).
>
> The passing score that was chosen in the 2014-15 VCCS, which was 51% - for individual scores, this means that a minimum of **14** points (53.8%) would be considered passing.
>
> Finally, the aspirational target would be for students to meet the faculty standard established in the QR-9 Manual (2013) of 19.4 (74.6%), or a score of **20** (76.9%) for an individual.

Methodology and Limitations

The Quantitative Reasoning Test was administered to students planning to graduate with an associate degree during the 2023-2024 academic year. BRCC graduates have been assessed at the time of graduation for over 15 years and participation is required of all associate degree graduates.

The assessment was made available to complete online, with instructions for access provided through emails and reminders during the semester of intended graduation. Students had approximately four weeks to complete the assessment, with some variation depending on how early students applied for graduation. A little over half of graduates self-reported taking the assessment somewhere on BRCC's campus (54%), with the majority of the remainder reporting taking the assessment at home (45%).

A limitation of the assessment was that there were not consistent testing conditions due to providing the flexibility of completing the test from a place of the participant's choosing. Additionally, the assessment might be considered low stakes because there was no impact on student grades or GPA. Student graduation is not impacted, but there is a hold placed on official transcripts if students do not complete this graduation requirement. An additional limitation is the number of test takers when examining results by program; there were 8 programs which had an *n* of less than 10.

The data from the previous implementation of the QR-9 in 2016-17 was analyzed for comparison data. This previous administration had an additional 6 custom questions added; these were removed for the purposes of this comparison. Participants who spent less than 10 minutes were removed from the 2016-17 data (somewhat accounting for the additional questions), whereas the data from the 2023-24 implementation only removed those who spent 5 or less minutes on the assessment.

In the absence of program level interventions, we expect general assessment scores to remain stable over time. For this administration of the QR-9, we would like this group of graduates to meet or exceed the scores from the previous administration in 2016-17 of **14.3** (55%). Additionally, we would like to see performance meet or improve upon the 2016-17 rates of passing (14 or higher) or meeting the faculty standard (20 or higher).

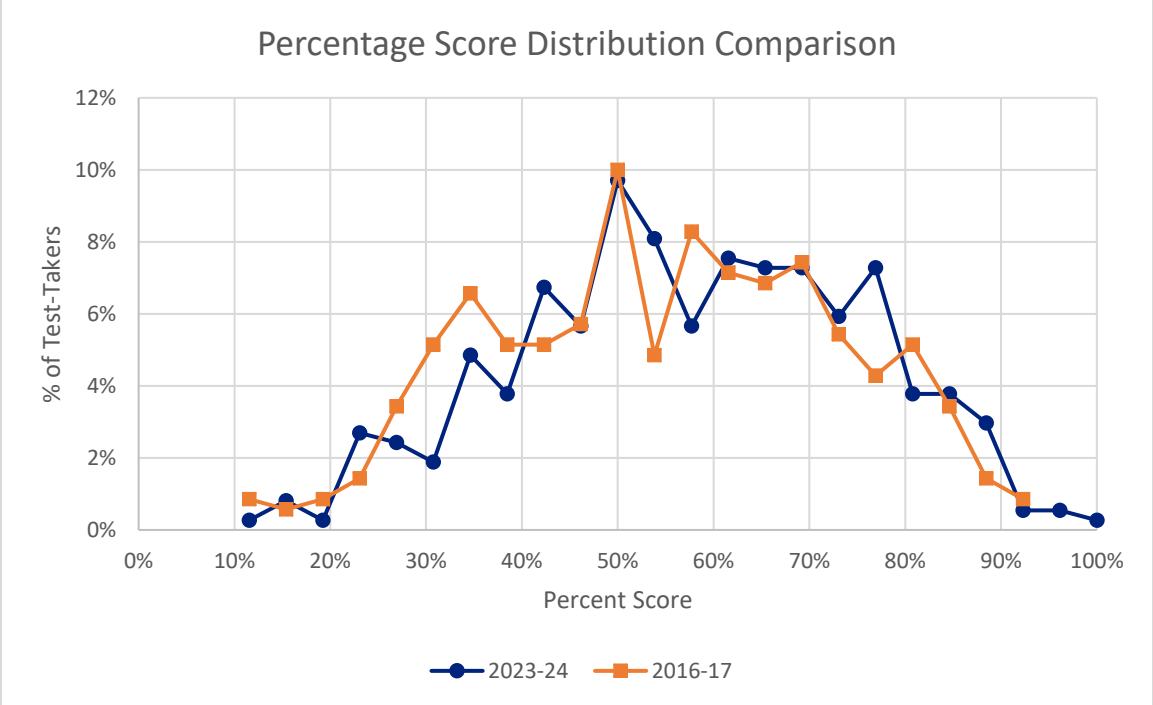
Test-Taker Demographics

In 2023-2024, there were 387 results. There were 6 submissions removed for spending less than 5 minutes on the assessment. When matched with graduates, 10 students who had not actually graduated with an associate degree were also removed, yielding 371 complete assessment records. The following tables describe the demographics of the 371 students. Detailed demographic information appears in *Appendix A: Quantitative Literacy Data Details*. Some general trends:

- Of the 501 AA&S, AS, and AAS degrees graduates of 2023-24, 371 (74%) completed the graduation assessment. Participation rates for the assessment were better than the previous years (62% in 2022-23; 55% in 2021-22).
- The program breakdown is roughly 58% transfer (AA&S and AS) to 42% career/technical (AAS).
- Within AAS degrees, more individual programs had 10 or more graduating participants than prior years: Advanced Manufacturing Technology, Business Management, Human Services, Information Systems Technology, Nursing, and Veterinary Technology. These programs each get a detailed mini-report on their program graduates. The rest of the AAS programs have only handfuls of test-takers and do not receive any program-level information.
- The students represented in this assessment are again majority White (73%), with the next largest group reporting as Hispanic (13%). Unlike the previous year, other ethnicities that had more than 10 students each included Asian (3%) and Two or More Races (3%), with an additional 5% Not Specified/Unknown.
- About a quarter (24%) of participants are First Generation students, and more than a third were Pell eligible (37%).

Results

For data details and tables, refer to *Appendix A*. Here, we summarize and discuss anything that stood out.



Established benchmarks and overall performance

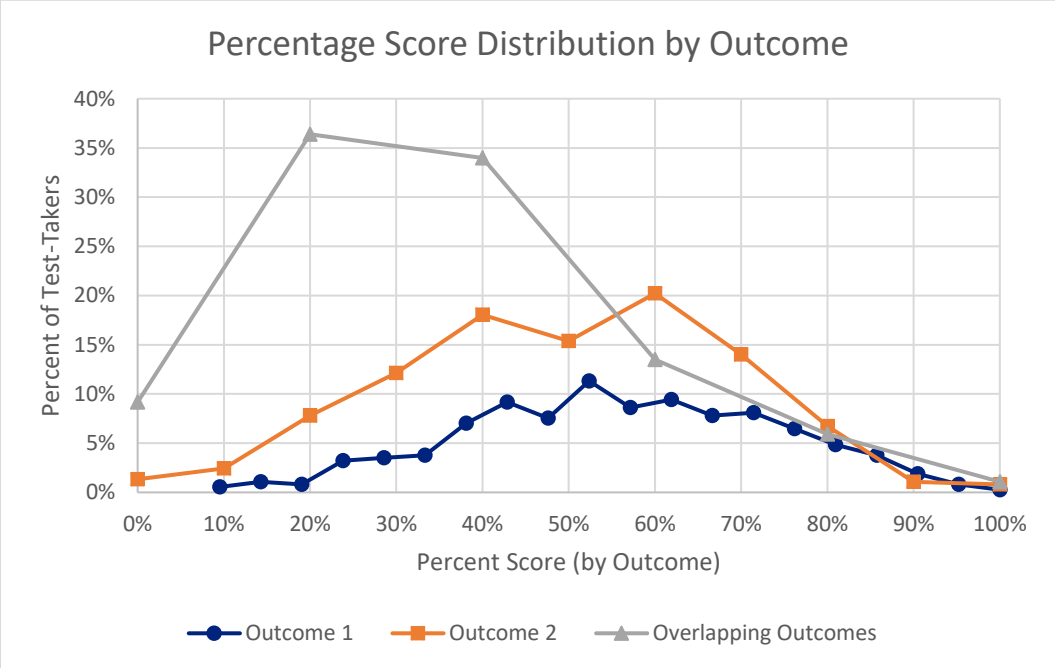
For comparison and analysis, we have the results of the previous administration of the QR-9 assessment in 2016-17. 350 students participated in that administration, with an average holistic score of 14.3 (SD = 4.66). **Current BRCC performance has significantly improved over 2016-17 performance**.

The assessment delivered in 2023-24 had 2 overall outcomes (details available in Appendix A):

1. **Outcome 1: Use of graphical, symbolic, and numerical methods to analyze, organize, and interpret natural phenomena.** (21 questions, 2-13, 18-26)
2. **Outcome 2: Discriminate between association and causation, and identify the types of evidence used to establish causation.** (10 questions, 1, 14-17, 20, 23-26).

Generally, graduates performed slightly better on questions that fell under Outcome 1 than those that fell under Outcome 2, with an average score of 56% (11.8 out of 21, SD = 3.80) on that outcome's questions compared to 49% (4.9 out of 10, SD = 1.96).

There were also 5 questions that fell under both outcomes. Graduates were more likely to struggle with these questions, with the average score on that small group of questions being only 35% (1.7 out of 5, SD = 1.06).



Change over time

BRCC last administered the *Quantitative Reasoning Test (Version 9)* in 2016-17. Tables 10 and 11 in Appendix A provide comparison data for change over time. Highlights include:

- The mean score for all BRCC graduates for the 2023-24 assessment was 15.0 (n = 371, SD = 4.61) out of a possible total of 26. The previous administration in 2016-18 had a mean score of 14.3 (n = 350, SD = 4.66). The increase is statistically significant (p = 0.0430).
- 60.9% scored an overall passing grade, with 19.1% meeting the faculty standard. In the previous administration in 2016-17, 55.1% scored a passing grade and 15.1% met the faculty standard.

- Of the AAS programs, Veterinary Technology had the most notable and significant gains. The average score between administrations raised from 13.1 in 2016-17 to 15.6 in 2023-24, and where 0% of Vet Tech graduates had previously met the faculty standard, 18.2% of 23-24 Vet Tech graduates did.

Variation among programs

Tables 10 and 11 also allow for some comparison between programs; however, as previously noted, a limitation of this type of assessment is that many of our programs only have/had a handful of graduates, and we only report out on programs with 10 or more.

- Generally, transfer programs tend to score significantly higher on these general education assessments than career/technical programs, but this year the difference was not quite statistically significant (p = 0.620); the mean score for AA&S and AS transfer programs combined was 15.4 (n = 215, SD = 4.63), while the mean score for all combined AAS programs was 14.5 (n = 157, SD = 4.51).
- Human Services scores were especially low, with a mean of 11.4 (n = 12, SD = 3.59) and 0% meeting the faculty standard; only 33.3% of these graduates made a passing score.

Variation among demographic groups

Disaggregated data are in multiple tables in *Appendix A*. We looked at race/ethnicity (Table 12), age (Table 13), Pell eligibility status (Table 14), and first-generation status (Table 15). We can look at each grouping in isolation and see if any broad trends jump out:

- Hispanic graduates underperformed in comparison to other groups, with a mean score of 13.2 (n = 49, SD = 4.33) and only 43% making a passing score.
- Graduates in their 30s tended to score the lowest, with a mean score of 13.7 (n = 49, SD = 4.72) with just over half (51%) making a passing score.
- There was significant difference between those who are Pell eligible versus not, with only 53% of Pell eligible graduates passing and 13% meeting the faculty standard compared to 60% passing and 23% meeting the faculty standard.
- A similar difference can be seen with First-Generation graduates: those who were first generation had a mean score of 13.8 (n = 90, SD = 4.22) with 52% passing and 13% meeting the faculty standard. Non-first-generation graduates had a mean score of 15.4 (n = 281, SD = 4.66) with 60% passing and 21% meeting the faculty standard.

Appendix A: Quantitative Literacy Data Details

Demographics:

Table 3 – Test-take Demographics, SIS Data (Age, Ethnicity, First Generation, Pell eligibility), 2023-24

Age Group		Ethnicity		First Generation		Pell Eligible	
≤17	16	African American	13	No	281	No	234
18-21	156	American Indian	1	Yes	90	Yes	137
22-29	130	Asian	10	**Total**	**371**	**Total**	**371**
30-39	49	Hispanic	49				
40-49	13	Not Specified/Unknown	17				
50 and over	**7**	Two or More Races	12				
Total	**371**	White	269				
		Total	**371**				

Table 4 – Test-taker by Gender (SIS Data Pull and Self-Reported with the QR-9 assessment), 2023-24

SIS Data			Self-Reported		
Female	234	63.1%	Female	223	60.1%
Male	134	36.1%	Male	126	34.0%
Unknown	3	0.8%	Non-binary/Non-conforming	5	1.3%
Total	371	100.0%	Transgender	5	1.3%
			Prefer not to respond	12	3.2%
			Total	371	100.0%

Table 5 – Number of test-takers by award and program (2023-24)

Award	Program	Frequency[1]	# of Degrees Awarded 23-24[2]
AA&S	College/University Transfer (and Specializations)	174	253
AS	Science (and Specializations)	41	49
AAS	(All AAS combined)	157	202
AAS	Accounting	3	4
AAS	Administration of Justice	7	8
AAS	Advanced Manufacturing Technology	13	18
AAS	Automotive Analysis and Repair	2	3
AAS	Aviation Maintenance Technology	3	5
AAS	Business Management	20	27
AAS	Computer & Electronics Tec	1	1
AAS	Emergency Medical Services (EMS)	7	10
AAS	Engineering Technology	2	2
AAS	Human Services	12	14
AAS	Information Systems Technology	10	17
AAS	Nursing	43	53
AAS	Technical Studies	1	2
AAS	Veterinary Technology	33	38

[1] One test-taker earned two associate degrees during the 23-24 academic year and is included in both counts.
[2] Two graduates earned two associate degrees during the 23-24 academic year and are included in both counts.

Results

Overall scores of 14 and above are considered passing; scores of 20 or above meet the faculty standard target established in the QR-9 manual.

Table 6 – Overall % of students in each performance category

	Not Passing (1-13)		Passing (14-26)		Faculty Standard (20-26)	
2023-2024	145	39.1%	226	60.9%	71	19.1%
2016-2017	157	44.9%	193	55.1%	53	15.1%

The overall average for participating BRCC graduates in 2023-2024 (n=371) was **15** out of 26, or **57.7%**. The scores ranged from 3 (11.5%) to 26 (57.7%), with a median score also of 15.

Table 7 – Overall results of the QR assessment 2023-2024

	Raw Score	Percentage
Average	15	57.7%
Minimum	3	11.5%
Maximum	26	100%
Median	15	57.7%

By Outcome

Outcome 1: Use of graphical, symbolic, and numerical methods to analyze, organize, and interpret natural phenomena. (21 questions, 2-13, 18-26)

Table 8 – Overall results of Outcome 1, 2023-24

Outcome 1 (21)	**Raw Score**	**Percentage**
Average	11.8	56.1%
Minimum	2	9.5%
Maximum	21	100%
Median	12	57.1%

Outcome 2: Discriminate between association and causation, and identify the types of evidence used to establish causation. (10 questions, 1, 14-17, 20, 23-26).

Table 9 – Overall results of Outcome 2, 2023-24

Outcome 2 (10)	**Raw Score**	**Percentage**
Average	4.9	49.5%
Minimum	0	0%
Maximum	10	100%
Median	5	50%

Table 10 – Overall results of questions that overlapped both outcomes, 2023-24

Overlapping Outcomes 1&2 (5)	**Raw Score**	**Percentage**
Average	1.7	34.8%
Minimum	0	0%
Maximum	5	100%
Median	2	40%

Program

Table 11 – Comparison of mean scores over time by program.

	BRCC: 2023 -2024			BRCC: 2016-2017					
	n	**M1**	**SD1**	***n***	**M2**	**SD2**	**M1-M2**	***p***	***d***
All Graduates	371	15.0	4.61	350	14.3	4.66	0.7	0.0430	0.1510
AA&S: College Transfer	174	14.8	4.50	183	14.4	4.68	0.4	0.4114	0.0871
AS: Science	41	17.8	4.37	24	18.4	4.46	-0.6	0.5978	0.1373
AAS: All Majors	157	14.5	4.51	145	13.5	4.24	1.0	0.0485	0.2285
AAS: Advanced Manufacturing Technology*	13	14.1	4.48	-	-	-	-	-	-
AAS: Business Management	20	14.9	4.25	13	14.5	5.06	0.4	0.8080	0.0856
AAS: Human Services	12	11.4	3.59	12	12.4	2.96	-1.0	0.4645	0.3039
AAS: Information Systems Technology*	10	12.8	4.02	-	-	-	-	-	-
AAS: Nursing	43	13.5	4.02	61	13	4.40	0.5	0.5557	0.1186
AAS: Veterinary Technology	33	15.6	4.02	26	13.1	3.02	2.5	0.0108	0.7032

*not enough participants in 2016-17

Table 12 – Comparison of percentage of students passing and meeting the faculty standard over time

	BRCC: 2023 - 2024			BRCC: 2016 - 2017				
	n	**P %1**	**FS %1**	***n***	**P %2**	**FS %2**	**Passing %1-%2**	**Faculty Standard %1-%2**
All Graduates	371	60.9%	19.1%	350	55.1%	15.1%	5.8%	4.0%
AA&S: College Transfer	174	61.5%	17.2%	183	60.1%	13.1%	1.4%	4.1%
AS: Science	41	75.6%	43.9%	24	79.2%	54.2%	-3.6%	-10.3%
AAS: All Majors	157	56.7%	14.6%	145	44.1%	11.0%	12.6%	3.6%
AAS: Advanced Manufacturing Technology*	13	53.8%	7.7%	-	-	-	-	-
AAS: Business Management	20	55.0%	20.0%	13	46.2%	15.4%	8.8%	4.6%
AAS: Human Services	12	33.3%	0.0%	12	33.3%	0.0%	0.0%	0.0%
AAS: Information Systems Technology*	10	40.0%	0.0%	-	-	-	-	-
AAS: Nursing	43	51.2%	4.7%	61	39.3%	9.8%	11.9%	-5.1%
AAS: Veterinary Technology	33	66.7%	18.2%	26	42.3%	0.0%	24.4%	18.2%

*not enough participants in 2016-17

Race/Ethnicity

Table 13 – Scores disaggregated by race/ethnicity (2023-24)

	Count	**Mean Score**	**SD**	**Average %**	**% Passing**	**% Faculty Standard**
African American	13	14.9	2.53	57.4%	69.2%	0.0%
Asian	10	15.7	4.86	60.4%	60.0%	30.0%
Hispanic	49	13.2	4.33	50.9%	42.9%	12.2%
Not Specified/Unknown	17	16.6	3.60	64.0%	76.5%	23.5%
Two or More Races	12	14.1	4.75	54.2%	58.3%	0.0%
White	269	15.2	4.69	58.6%	62.8%	21.6%

Race/Ethnicity disaggregation excludes a single American Indian participant.

Age

Table 14 – Scores disaggregated by age (2023-24)

	Count	Mean Score	SD	Mean %	% Passing	% Faculty Standard
≤17	16	14.8	4.91	56.7%	56.3%	25.0%
18-21	156	15.4	4.34	59.2%	66.0%	17.9%
22-29	130	15.0	4.87	57.5%	56.9%	23.1%
30-39	49	13.7	4.72	52.6%	51.0%	10.2%
40-49	13	15.8	4.02	60.7%	69.2%	23.1%

Participants 50 and over were excluded from age disaggregation due to an n<10.

Pell

Table 15 - Scores disaggregated by Pell status (2023-24)

	Count	Mean Score	SD	Mean %	% Passing	% Faculty Standard
Pell	137	14.0	4.78	53.8%	53.3%	13.1%
No Pell	234	15.6	4.40	59.9%	65.4%	22.6%

First Generation

Table 16 - Scores disaggregated by First Generation (2023-24)

	Count	Mean Score	SD	Mean %	% Passing	% Faculty Standard
First Generation	90	13.8	4.22	53.1%	52.2%	13.3%
Not First-Gen	281	15.4	4.66	59.1%	63.7%	21.0%

Reference

Sundre, D.L. (2008). The Quantitative Reasoning Test, Version 9 Test Manual. Harrisonburg, VA: Madison Assessment, LLC