

Investigation to Understand the Assessment of Critical Thinking in UNC's Liberal Arts Core

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Executive Summary

During the 2016-2017 academic year, the Faculty Assessment Fellows (FAF) and Assessment Office staff conducted a project (1) to gather information about how student learning is currently assessed by faculty teaching Liberal Arts Core courses and (2) to evaluate common methods used by other institutions to assess general education learning outcomes. Results from the project were used to develop recommendations to the LAC Ad Hoc Assessment Committee and the Liberal Arts Council for conducting a pilot assessment of general education learning outcomes in fall 2017. This report includes an executive summary of major findings and recommendations followed by a detailed description of the project results.

Major Findings on Assessment Methods Used by LAC Faculty

In fall 2016, a survey was distributed to all faculty teaching LAC courses in areas 3, 4, and 5 (N = 87). These three areas were chosen because they share a common gtPathways learning outcome, critical thinking, and because they represent a broad range of disciplines. The survey contained closed-response and open-ended items. Thirty-four faculty completed the survey (39%), and 31 provided 69 assignments demonstrating how they assess critical thinking. Data were analyzed to answer three questions:

1. What types of assignments do UNC faculty use to assess critical thinking in LAC courses?
2. What gtPathways critical thinking outcomes are assessed in LAC courses?
3. At what levels of Bloom's taxonomy are gtPathways critical thinking learning outcomes assessed in LAC courses?

Types of assignments used by UNC faculty to assess critical thinking. UNC faculty reported a variety of types of assignments, frequencies of use, and comments, including the following:

- Faculty reported using multiple assignments and assignment types to assess critical thinking, including closed-response assignments (multiple choice, true/false, matching, etc.), written assignments, oral communication, and mathematical or graphical representations.
- Written assignments, oral communication, and closed-response assignments were the most frequently used methods for assessing critical thinking.
- 59% of respondents reported using four or more assignments in their course to assess critical thinking.
- In open-ended responses, some faculty indicated they are not able to use the type of assignments they think would be most effective for teaching and assessing critical thinking because of large class sizes.
- Some faculty reported that students' poor writing skills affect their ability to assess critical thinking in written assignments.

gtPathways critical thinking outcomes assessed in LAC courses. Although faculty were not specifically asked to provide assignments that assess gtPathways critical thinking learning outcomes, most of the assignments did assess one or more of these.

- The most frequently assessed critical thinking learning outcomes¹ were the following:
 - Use information to describe a problem or issue and/or articulate a question related to the topic.
 - Evaluate the relevance of context when presenting a position.
 - Interpret/evaluate sources to develop an analysis or synthesis.
 - Establish a conclusion that is tied to the range of information presented.
- The least frequently assessed critical thinking learning outcomes were the following:
 - Analyze one’s own and others’ assumptions. (This outcome is generally not assessed in the assignments that were provided.)
 - Ask a question relevant to the discipline.
 - Reflect on implications and consequences of stated conclusion.
- 38% of submitted assignments did not assess any of the gtPathways critical thinking learning outcomes. This result should be interpreted with caution, as the gtPathways learning outcomes were only recently adopted, and at the time of data collection, faculty had not begun revising courses to reflect the new learning outcomes.

Bloom’s Taxonomy levels assessed. Bloom’s taxonomy provides a framework for thinking about different levels of learning moving from memory, to comprehension, application, analysis, synthesis, and evaluation. Additional information about Bloom’s Taxonomy can be found in the appendix.

- Critical thinking was assessed most frequently at the applying level, with analyzing and evaluating as the next most frequently used levels.
- There were no significant differences across faculty ranks or LAC areas in terms of the level at which critical thinking is assessed.

Major Findings from Evaluation of Common General Education Assessment Methods

There are a number of methods used by institutions to assess general education learning outcomes. Three of the most common are standardized tests, portfolios, and course-embedded assessments. While there are variations within each method, they can generally be defined as follows:

External standardized tests. These are tests developed by professional testing organizations (ETS, ACT, etc.) to assess one or more general education learning outcomes. Standardized tests are typically administered to a representative sample of students and then scored by the testing organization. Standardized tests offer some benefits, including established reliability and validity, comparison data from other institutions, and minimal impact on faculty time. Drawbacks include poor alignment to institutional learning outcomes, lack of faculty and student buy in, logistical challenges, and cost. Unless the tests are tied to a program or graduation requirement, students may not put forth their best effort. There are also concerns among some educators that multiple choice tests (the most common format) are inadequate for assessing higher-order knowledge and skills.

Portfolios. Portfolios are a collection of student artifacts to show learning over time or to provide a summative collection of a student’s best work. The advent of new technologies has provided a platform for constructing digital portfolios (e-portfolios) of written documents,

¹ See Table 1 for a complete list of the gtPathways critical thinking learning outcomes.

images, and multimedia materials. Portfolios are considered an authentic form of assessment because they are composed of work students produce as part of the educational requirements of a course or program. Portfolios can be used to promote deep learning through an emphasis on student reflection and making connections between courses and other educational experiences. They can be used simultaneously for both individual student and program assessment. Although research has shown portfolios to be effective in promoting deep learning, there are some drawbacks to using them for general education assessment. These include effective training and support for faculty and students, a significant time commitment to collecting and scoring student artifacts, developing objective scoring rubrics, and securing and implementing technology for storing and evaluating the portfolios.

Course-embedded assessment. Course-embedded assessment relies on assignments that faculty identify as appropriate for assessing the learning outcome(s) of interest. These assignments may be unique to individual courses or developed collaboratively among faculty who agree to adopt a specific assignment in their courses. Course-embedded assessments are generally scored using a rubric. Assignments may be scored by the faculty teaching the course or by a team of faculty from across the department or institution. The course-embedded method has several advantages. Students may be more motivated to do their best work because the assignments are required. Faculty may also be more willing to participate if they are able to use existing course assignments. Depending on who does the scoring, course-embedded assessment provides an opportunity for collecting outcomes data for every student, which allows for longitudinal studies. Team scoring can reduce the workload for individual faculty and might yield more objective results. Some drawbacks associated with the method include the following: (1) validity and reliability of the results; (2) concerns by faculty that assessment results would be used to evaluate them; (3) additional workload requirements; (4) sampling limitations based on time and cost constraints; and (4) additional costs if a team approach to scoring is adopted.

Recommendations for a Pilot Assessment

After reviewing the results of the survey and evaluating methods used at other institutions, the study team offers the following recommendations. Our rationale for these recommendations can be found in the Conclusion and Recommendation section of this report. A more detailed plan for the pilot will be developed and presented to the LAC upon approval of these recommendations.

1. The pilot should use the gtPathways critical thinking learning outcomes and rubric, which were developed during the recent gtPathways competency revision process.
2. The pilot should be conducted using the course-embedded method.
3. The pilot should be limited to written assignments.
4. The pilot should be limited to only those outcomes that are most frequently assessed.
5. An assessment team of faculty from across disciplines should be recruited to score student artifacts.

Additional Issues to be Considered by the Liberal Arts Council

Although not the purpose of our study, our analysis of the results raised some issues the Liberal Arts Council may wish to consider moving forward. These include the following:

1. Some additional research questions emerged that the LAC may wish to investigate in the future. These include the following:
 - a. Are certain types of assignments better suited for assessing critical thinking across courses than others?
 - b. To what extent does poor writing affect students' critical thinking outcomes?
 - c. What is the effect of class size on critical thinking outcomes?
2. We found that some outcomes are less frequently assessed than others. The LAC may wish to consider whether standards and expectations for assessing all outcomes are necessary.
3. Although we received a reasonably strong response rate, the majority of faculty did not complete the survey. The LAC may wish to consider developing requirements for faculty who teach LAC courses regarding their participation in assessment.
4. Our results showed that faculty are addressing multiple levels of learning in their LAC courses, which reflects a good understanding of how students learn. The LAC may wish to consider working with CETL or the Assessment Office to create professional development opportunities that expand current good practice.
5. While consent is not required for using student artifacts for assessment purposes, the LAC may wish to consider adopting a statement to be included on syllabi or via other communications with students indicating that their work may be reviewed by other faculty for assessment purposes.

Project Overview

General education (GE) is typically the part of an undergraduate university education intended to help students gain general knowledge and skills such as critical and creative thinking, written and oral communication, and awareness of diverse perspectives. GE courses and the learning outcomes associated with them complement what students learn in their major.

The University of Northern Colorado (UNC) Liberal Arts Council (the body that oversees the UNC GE program) has initiated a process to reform its GE program (called Liberal Arts Core). The Council prioritized improving learning outcomes assessment of the LAC program as a goal for academic year 2016-2017. Working in consultation with the LAC and the LAC Assessment Ad Hoc Committee, a team of Faculty Assessment Fellows and Assessment Office staff was charged to 1) conduct a study to understand how student learning outcomes are assessed in LAC courses and 2) to design and implement a pilot learning outcomes assessment plan for the LAC program.

During the 2016-2017 academic year, the Faculty Assessment Fellows and Assessment Office staff conducted a project 1) to gather information about how student learning is currently assessed in the UNC LAC program and 2) to identify the types of assessment methods used nationally to assess student learning in GE. The findings from the project will be used to develop and pilot an assessment plan for the LAC program in the 2017-2018 academic year. The findings from the 2016-2017 project are described in the remainder of this report.

Part 1: How Is Student Learning Assessed in the UNC LAC Program?

The Colorado Department of Higher Education recently revised the learning outcomes required of gtPathways courses, which include most UNC LAC courses. In the revision, critical thinking was identified as an important learning outcome across multiple gtPathways disciplines and across multiple UNC LAC areas. Table 1 shows the gtPathways critical thinking learning outcomes and the LAC areas required to teach and assess those outcomes. To focus our study, we collected assignments from LAC area courses required to cover critical thinking.

The purpose of our data collection was to understand how student learning related to the gtPathways critical thinking outcomes are currently assessed in the relevant LAC area courses. We will use the information gathered to develop a pilot learning outcomes assessment plan for the LAC program. The information gathered for this study will not be used to evaluate individual faculty or instructors or to evaluate the effectiveness of courses. We asked the following questions:

1. What types of assignments (e.g., closed-response, written, graphical, and the like) do UNC faculty use to assess critical thinking in LAC courses?
2. What gtPathways critical thinking learning outcomes are assessed in LAC courses?
3. At what levels of Bloom's taxonomy are gtPathways critical thinking learning outcomes assessed in LAC courses?

Table 1. gtPathways critical thinking learning outcomes and the LAC areas that cover those outcomes.

gtPathways Critical Thinking Learning Outcomes	LAC Areas Covering the Outcomes						
	3A	3B	3C	4	5A	5B	5C
1. Explain an Issue			x		x	x	x
a. Use information to describe a problem or issue and/or articulate a question related to the topic.			x		x	x	x
2. Utilize Context	x	x	x		x	x	x
a. Evaluate the relevance of context when presenting a position.	x	x	x		x	x	x
b. Identify assumptions.	x	x	x		x	x	x
c. Analyze one's own and others' assumptions.	x	x	x		x	x	x
3. Formulate an Argument				x			
a. Ask a question relevant to the discipline.				x			
b. Synthesize perspectives that answer it.				x			
4. Incorporate Evidence				x			
a. Interpret/evaluate sources to develop an analysis or synthesis.				x			
5. Understand Implications and Make Conclusions	x	x	x	x	x	x	x
a. Establish a conclusion that is tied to the range of information presented.	x	x	x	x	x	x	x
b. Reflect on implications and consequences of stated conclusion.	x	x	x	x	x	x	x

Who Completed the Survey

All faculty members who taught LAC courses in areas 3, 4, and 5 during the Fall 2016 semester were invited by email to complete an online survey (see appendix for survey questions). We also sent information about the survey to the chairs, directors, and coordinators for the UNC programs, departments, and schools that offered courses in areas 3, 4, and 5. We asked chairs, directors, and coordinators to encourage their faculty to complete the survey.

- There were 87 faculty members who taught courses in those LAC areas during the Fall 2016 semester.
- Thirty-four faculty members, of the 87 invited, completed the survey.
- Of the 34 who completed the survey, 31 submitted assignments demonstrating how they assess critical thinking.
- LAC areas 3a, 4, and 5c had the largest number of faculty participants (Figure 1).
- Adjunct, tenured associate professors, and tenured professors were the largest number of participants (Figure 2).
- The faculty had a range of experience teaching the courses in their LAC areas (Table 2). The mean number of times courses were taught in the LAC areas ranged from 8 (LAC area 3b) to 30 (LAC area 5a) times. The lowest number of times a course was taught was once (LAC areas 3a, 3b, 4, and 5c), and the highest number of times a course was taught was 66 (LAC area 5b).

Figure 1. Number of faculty members in each LAC area who completed the survey and who submitted assignment examples. LC = LAC.

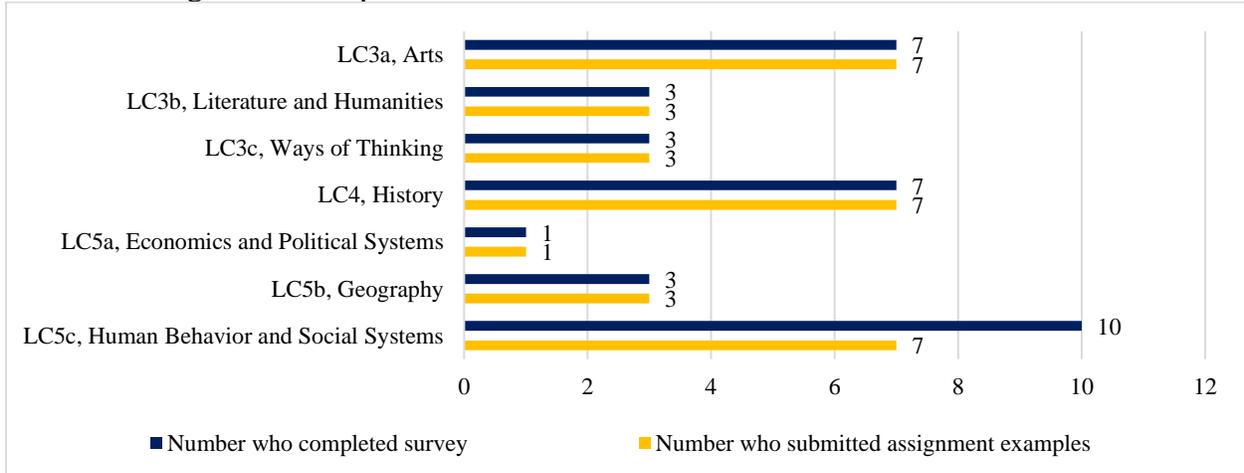


Figure 2. Number of faculty members from each rank who completed the survey and submitted assignments.

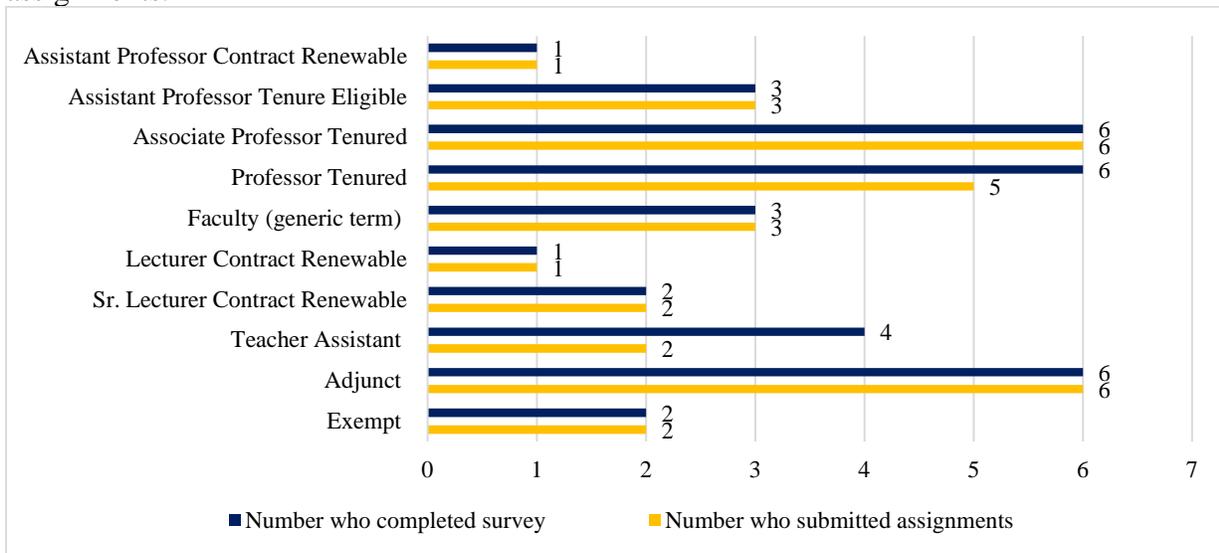


Table 2. Number of faculty who completed the survey, the mean number of times courses in the LAC area were taught, the lowest and highest number of times a course was taught by the faculty in the LAC areas who completed the survey. LC = LAC.

LAC Area	# of faculty	mean # of times area courses taught	Lowest number of times an area course was taught	Highest number of times an area course was taught
LC3a, Arts	7	14	1	42
LC3b, Literature and Humanities	3	8	1	12
LC3c, Ways of Thinking	3	11	5	15
LC4, History	7	20	1	60
LC5a, Economics and Political Systems	1	30	30	30
LC5b, Geography	3	27	6	66
LC5c, Human Behavior and Social Systems	10	9	1	50

Assignment Types Used to Assess Critical Thinking in LAC Courses

- All 34 faculty members who completed the survey reported that they assessed critical thinking in their LAC course.
- Seven types of assignments were used to assess critical thinking in the LAC courses (Table 3).
- Written assignments of varying lengths were the most frequent types of assignments faculty members used to assess critical thinking (Table 3).
- Of the 34 faculty members who completed the survey, 33 reported using multiple types of assignment methods (e.g., closed response assignment, short written assignment, and oral communication) in their LAC course to assess critical thinking (Table 4). On average, faculty members reported using four different assignments types to assess critical thinking in their class.
- The frequency at which each assignment type is used to assess critical thinking varies by LAC area (Figure 3).
- Thirty-one faculty members submitted a total of 69 assignments as exemplars of the type of assignments they used to assess critical thinking (Figure 4). Short, medium, and long written assignments were the most frequent types of assignment submitted (Figure 4).
- LAC areas 3a, 4, and 5c had the most assignments submitted (Figure 5).

Table 3. Thirty-four faculty members described the type of assignments they use to assess critical thinking in their LAC area courses. Faculty members could select more than one assignment type.

Assignment Type	Assignment Description	# of faculty	% of faculty
Closed-response assignment	Any type of quiz, test, or assignment that has multiple choice, true/false, matching, checklist and the like.	27	79%
Short written assignment, < 1 page	Assignment that requires students to demonstrate their learning by writing less than 1 page. Could include short answer questions, short essay, and the like.	21	62%
Medium & Long written assignment, > 1 page	Assignment that requires students to demonstrate their learning by writing in more than 1 page. Could include essays, research papers, literature reviews, and the like.	29	85%
Oral communication	Assignment that requires oral demonstration of learning including presentations, debate, classroom discussion, and the like.	29	85%
Mathematical or numerical assignment	Assignment that requires students to demonstrate learning with numbers (for example, creating a budget, solving mathematical problems, and the like).	2	6%
Graphical or pictorial representation	Assignment that requires students to demonstrate learning with a graphical or pictorial representation (for example, a diagram, table, chart, and the like).	10	29%
Other	Assignment that does not fit into the categories above.	4	12%

Table 4. Number types of assignments used by faculty members to assess critical thinking in their LAC course and the number of faculty members.

Number of Assignment Types Used to Assess Critical Thinking	Number of Faculty Members
No assignment used to assess critical thinking	0
1 assignment type used to assess critical thinking	1
2 assignment types used to assess critical thinking	6
3 assignment types used to assess critical thinking	7
4 assignment types used to assess critical thinking	12
5 assignment types used to assess critical thinking	8
6 assignment types used to assess critical thinking	0
7 assignment types used to assess critical thinking	0

Figure 3. Percentage of faculty in each LAC area reporting that they use each assignment type to assess critical thinking.

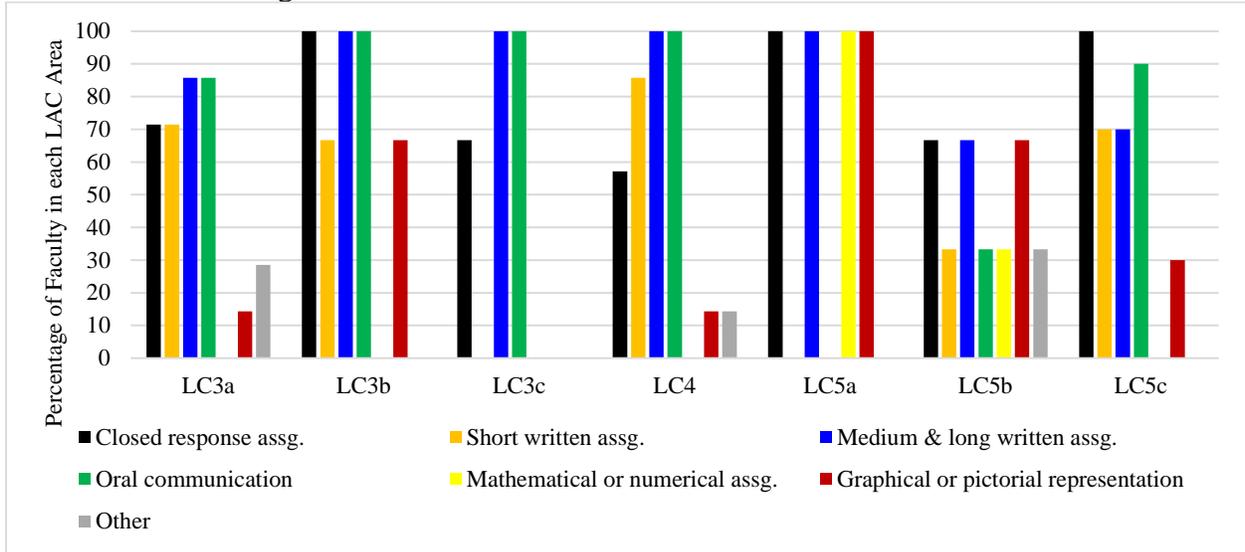


Figure 4. Number of submitted assignments that included each type of assessment method. Sixty-nine assignments were submitted. Most assignments had more than one type of method. For example, an assignment could have close-ended questions, a short-written question, and a graphical question.

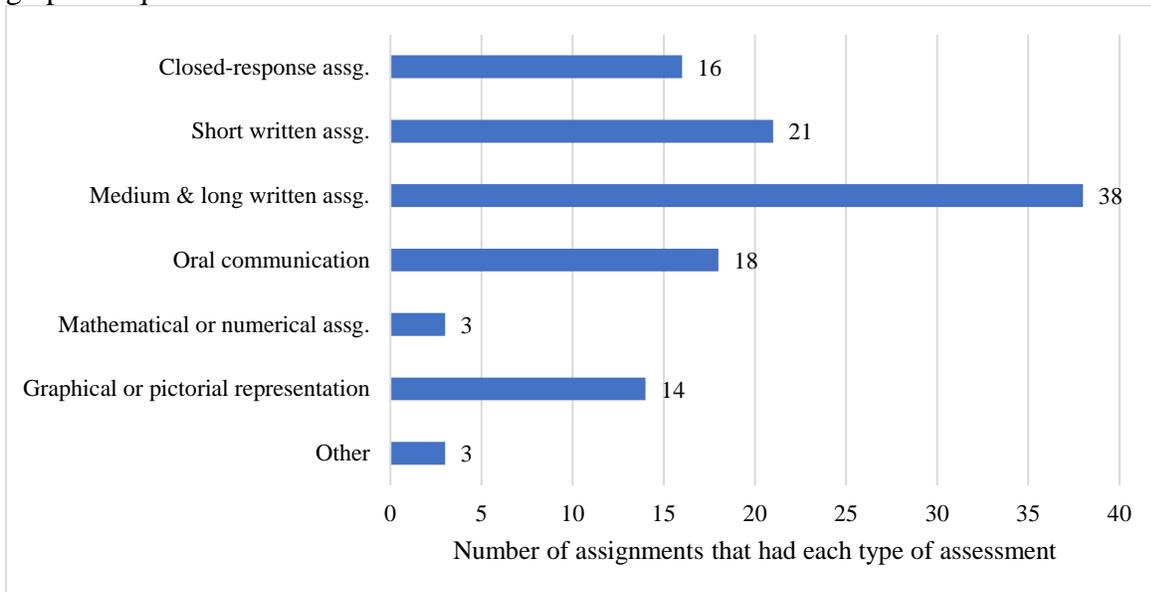
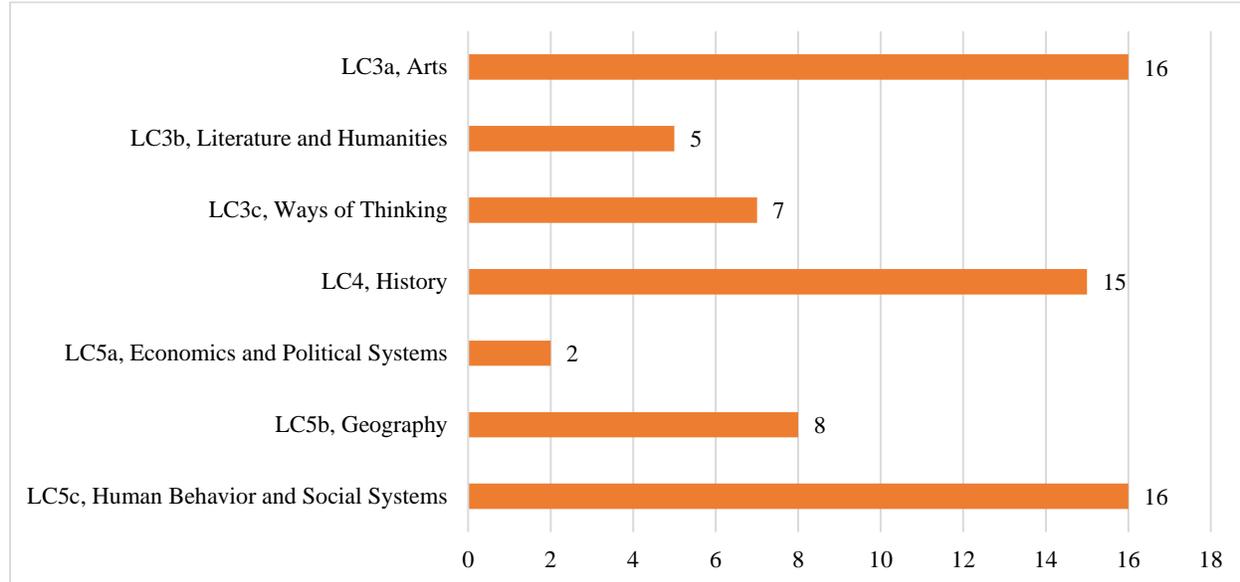


Figure 5. Number of assignments submitted in each LAC area. Sixty-nine assignments were submitted.



Critical Thinking gtPathways Learning Outcomes Assessed in LAC Classes

As described in Table 1, each LAC area has specific gtPathways critical thinking learning outcomes that are intended to be taught and assessed across the courses in that area. Each assignment submitted was evaluated to determine if it assessed the gtPathways critical thinking learning outcomes intended for that area. There was no expectation that any particular assignment should assess any particular gtPathways critical thinking learning outcome or that the assignment should assess a specific number of outcomes. The purpose of the evaluation was to create a snapshot of which gtPathways critical thinking learning outcomes are covered by assignments in the LAC areas. The appendix describes the rubrics used to evaluate assignments.

- Of the 69 assignments that were submitted, 38% did not assess any of the gtPathways critical thinking learning outcomes (Table 5). Twenty-five percent of assignments assessed three learning outcomes assessed, which was the most frequent number of outcomes assessed (Table 5).
- SLOs 1a, 2a, 4a, and 5a were the most frequently assessed outcomes across the LAC areas that included these outcomes (Table 6 and Figure 6).
- SLOs 2c, 3a, and 5b were the least frequently assessed outcomes across LAC areas that include these outcomes (Table 6 and Figure 6).
- gtPathways learning outcome 2c (Analyze one’s own and others’ assumptions) is largely not assessed across all LAC areas that are intended to teach and assess that outcome.
- The percentage of assignments that assess each learning outcome is in Figure 6, and the percentage of assignment types that assess each learning outcome is in Figure 7.
 - SLOs 2a and 5a are the most frequent outcomes assessed, and most assignment types are used frequently to assess those outcomes.
 - Closed-response assignments and short written assignments are used to assess most of the SLOs, particularly 2a and 5a.
 - Medium and long written assignments most frequently assess SLOs 5a and 5b.

- Oral communication most frequently assesses SLO 2a.
- Mathematical or numerical assignments most frequently assess SLOs 2a and 2b.
- Graphical or pictorial representation assignments most frequently assess SLOs 2a and 2b.
- Those SLOs less frequently assessed (2c, 3a, 3b, and 4a) are assessed mostly by short, medium, and long written assignments.

Table 5. The number of SLOs that were assessed by submitted assignments. The number and percentage of assignments assessing each number of SLOs are included.

Number of SLOs Assessed	Number of Assignments	Percentage
0 SLO	26	38%
1 SLO	5	7%
2 SLO	5	7%
3 SLO	17	25%
4 SLO	10	14%
5 SLO	4	6%
6 SLO	2	3%

Table 6. Number of assignments covering each gtPathways critical thinking learning outcome by LAC area. NA indicates that the student learning outcome was not intended to be taught and assessed in the LAC area. Table 1 has the text describing each learning outcome.

LAC area	SLO 1a	SLO 2a	SLO 2b	SLO 2c	SLO 3a	SLO 3b	SLO 4a	SLO 5a	SLO 5b	Number of assignments submitted
LC3a	NA	10	6	1	NA	NA	NA	6	3	16
LC3b	NA	3	2	2	NA	NA	NA	3	2	5
LC3c	3	2	3	2	NA	NA	NA	3	0	7
LC4	NA	NA	NA	NA	1	5	7	8	4	15
LC5a	1	1	2	0	NA	NA	NA	2	1	2
LC5b	4	5	4	0	NA	NA	NA	3	2	8
LC5c	8	9	4	2	NA	NA	NA	8	6	16

Figure 6. Percentage of assignments that covered each SLO (total assignments covering each SLO divided by total assignments that could cover each SLO across all LAC areas).

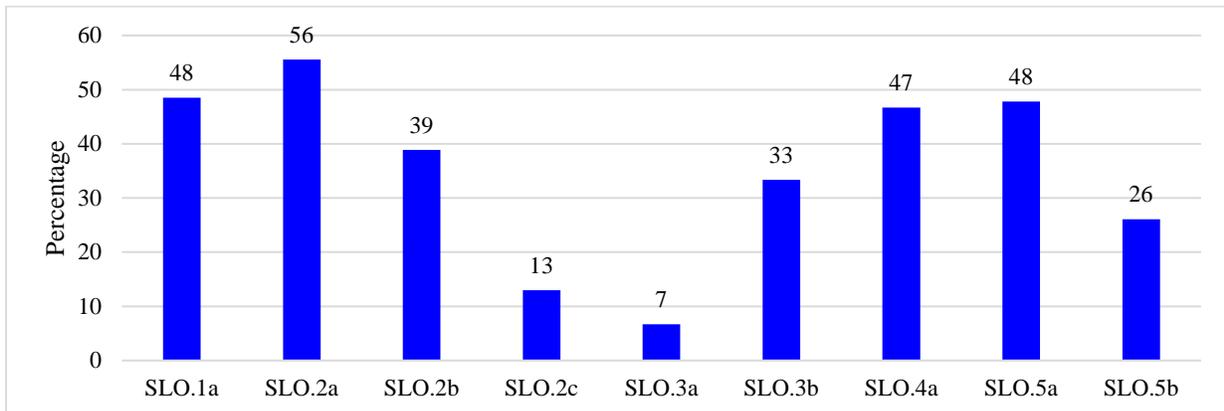
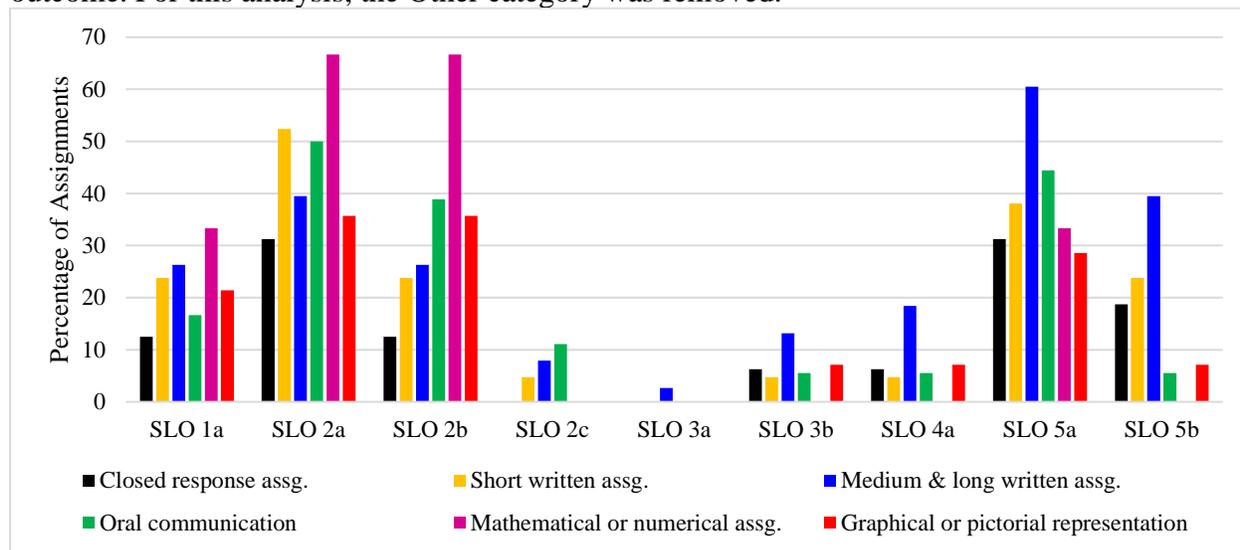


Figure 7. Percentage of assignment types that assess each gtPathways critical thinking learning outcome. For this analysis, the Other category was removed.



Levels of Bloom's Taxonomy that Are Assessed in the Assignments

Each assignment was evaluated to determine the level of learning demonstrated using Bloom's Taxonomy (see the appendix for a description of Bloom's taxonomy and to see the scoring rubric). The entire assignment was evaluated, and a score was given based on the highest level of learning found in the assignment. As shown in Table 5 above, 26 of the 69 assignments submitted did not assess any of the gtPathways critical thinking learning outcomes. This left 43 assignments scored with Bloom's taxonomy (Table 7).

- The two lowest Bloom's levels (i.e., remembering and understanding) and highest Bloom's level (i.e., creating) were the least frequent levels at which critical thinking was assessed.
- The Applying level was the most frequent level at which critical thinking was assessed. The Analyzing and Evaluating levels were the next most frequent levels at which critical thinking was assessed.
- We also examined faculty rank in relation to the level of Bloom's taxonomy at which assignments were scored (Table 8). There were no significant differences across the faculty ranks and the level of Bloom's taxonomy at which their assignments assessed critical thinking. Faculty members across all ranks were equally as likely to use different levels of Bloom's taxonomy in their assessments.
- We examined LAC areas in relation to the level of Bloom's taxonomy (Table 9). There were no significant differences across the LAC areas and the level of Bloom's taxonomy at which assignments assessed critical thinking. Faculty members across LAC areas were equally likely use different levels of Bloom's taxonomy in their assessments.

Table 7. Number and percentage of assignments scored at each level of Bloom's Taxonomy. Number of assignments was 43.

Bloom's Level	Number of Assignments	Percentage of Assignments
Remembering	0	0%
Understanding	4	9%
Applying	13	30%
Analyzing	11	26%
Evaluating	11	26%
Creating	4	9%

Table 8. Number of faculty members at each rank with assignments at each level of Bloom's taxonomy.

Faculty Rank	Bloom's Taxonomy Level					
	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Adjunct Professor	0	1	4	1	2	1
Assistant Professor	0	1	3	0	2	2
Associate Professor	0	0	4	2	4	1
Full Professor	0	1	1	3	1	0
Exempt Faculty	0	0	0	1	2	0
Teaching Assistant	0	0	1	0	0	0

Table 9. Number of assignments in each LAC area at each level of Bloom's taxonomy.

LAC Area	Bloom's Taxonomy Level					
	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
LC3a-Arts	0	2	2	5	3	0
LC3b-Literature & Humanities	0	0	1	0	1	1
LC3c-Ways of Thinking	0	0	0	0	3	1
LC4-History	0	1	1	4	1	1
LC5a-Economic & Political Systems	0	0	1	1	0	0
LC5b-Geography	0	1	2	1	0	1
LC5c-Human Behavior & Social Systems	0	0	6	0	3	0

Additional Input on Assessing Critical Thinking in LAC Classes

Faculty members provided written thoughts and concerns about assessing critical thinking in their courses. There were three main themes that came out of the written responses (Table 10 has examples of written comments for each theme).

1. **Class sizes are barriers to teaching and assessing critical thinking.** Faculty members said that their class sizes reduced their ability to do a good job teaching and assessing critical thinking. Faculty said that they were unable to teach or use the type of assignments that they thought were most effective at assessing critical thinking because of their class size.

2. **Students' writing skills need improvement.** Many professors use written assignments to assess critical thinking. However, some participants thought that students' writing skills were lacking. The ability to communicate clearly and the ability to think critically are two measurable skills. Students may perform poorly in critical thinking assignments that require writing if their writing skills are lacking.
3. **Faculty use a range of assignments to assess critical thinking.** Faculty members described a range of types of assignments that they used to assess critical thinking.

Table 10. Themes for the concerns and thoughts faculty members had about teaching and assessing critical thinking in LAC classes.

Theme	Quote
Class sizes are barriers to assessing critical thinking	<ul style="list-style-type: none"> • "I would like to do much more assessment of critical thinking in my class, but it is time consuming in a 40-person class, especially where there is pressure to continue increasing course caps. One semester, my course cap was 60...I used to assign 2 or 3 essays rather than one, but the grading time of these was crushing to give students the feedback they needed, and I had to cut it to one writing assignment." • "Standardly capped at approximately 50 students, the class is too large to make it possible to do a really good job of teaching critical thinking or assessing student progress in critical thinking." • "Learning in large lectures can happen in small groups if it is structured appropriately. These big classrooms cover so much material and can be so impersonal that our young, new- to-college students are at a disadvantage if we only offer a midterm and a final."
Writing skills need improvement	<ul style="list-style-type: none"> • "Papers, short essay, and even simple responses are often indecipherable. Simple five paragraph essays are especially unintelligible." • "Many students struggle in this class because they do not have strong writing skills and find it difficult to present a literary argument." • "As a whole, I see that my students' writing skills are not at a college level."
A range of assignment types are used to assess critical thinking	<ul style="list-style-type: none"> • "the readings and discussion, studio, research, and creative writing projects in the texts provide a variety of learning styles." • "I promote discussion during lecture every class session to encourage students to evaluate the information and engage with materials." • "effective assignments / assessments (those from which they learn the most and forget the least) seem to be the ones where they have to apply one thing to analyze another; e.g. watch two short films and analyze them in light of a reading." • "emphasize data-based in-class activities and short write-ups. These mirror the type of memo- and summary-writing people do in most entry-level professional positions." • " I spread assessments across multiple categories, including online quizzes (multiple choice), in-class quizzes (short answer), and essays that range from the demonstration of particular skills (e.g., a shot-by-shot analysis of a scene of film) to a more traditional, open-ended humanities paper in which they are asked to make a claim and use evidence to back up that claim in argument." • "The short essay (written assignment) - where the assignment is to critically analyze a research paper of their choice in the area of economics - would be the best approach to assess critical thinking." • "I try to write multiple choice items that assess students' application of the content to novel situations, and have short answer items that ask students to explain, elaborate, and provide examples of topics we covered in class."

Part 2: Methods for Assessing Critical Thinking in General Education

The Faculty Assessment Fellows collected information to answer the questions: What assessment methods are used by other universities to assess GE, and how do these methods align with the UNC needs and context? To answer the questions, the Fellows gathered information from journal articles and reports, interviews with faculty and assessment coordinators at other universities, and documents from national assessment and general education organizations. Three methods were identified: external standardized tests, portfolios, and course-embedded assessments. A summary of the method characteristics, pros and cons, and applicability to the UNC context are provided for each method.

External Standardized Tests

Summary of major characteristics. Various professional test developers have created standardized tests that assess the knowledge and skills included in many general education programs. Many of the tests use multiple-choice questions, some have multiple-choice questions and essay questions, and some have only essay questions. Most tests are scored by the professional organization who created the tests. The organization then provides the institution with a report of the results. Other tests can be scored locally. The cost of the test can vary from one dollar per student to more than \$20 per student depending on how many copies of the test are purchased.

Pros associated with method. There are several strengths associated with external, standardized tests.

1. External, professionally developed tests have established reliability and validity.
2. The results are often analyzed and summarized by the professional organization, reducing the time faculty and staff need to devote to such efforts.
3. Results are provided with comparisons of your students with students at other similar institutions.
4. Tests can be administered online so that time is not required during class for students to complete the tests.
5. Assessment efforts can be coordinated at the institutional-level so that faculty do not need to invest a significant amount of their own time assisting with the effort.

Cons associated with method. There are a number of limitations associated with external, standardized tests.

1. Alignment with university outcomes: Often standardized tests do not align with university learning outcomes.
2. Reliance on multiple-choice questions. Most of the standardized tests use multiple-choice questions. Some education and assessment experts believe that multiple-choice questions are inadequate for assessing higher order knowledge and skills.
3. Lack of buy-in from faculty and students. Faculty may have limited buy-in to the results because the questions may not align with institutional outcomes and because faculty have limited engagement with the assessment. Students may have limited motivation because the tests are not part of their course grades. Faculty at other institutions have voiced concerns about which students are taking the test and whether they are actually putting forth their best effort if there is no incentive to do well or penalty for doing poorly.
4. Space and Time: Some institutions report challenges in finding time, space, and technology for students to complete the tests.

5. Cost. The cost to purchase the test could be significant depending on how many tests are purchased.
6. When to Assess: There is much debate about when to implement a cohesive test assessment. Options include after a particular number of credit hours, within a certain number of credit hours to graduate, after all general education classes are completed, in a student's final semester, among others. Each of these is problematic for different and obvious reasons.

Applicability to UNC context. Very few institutions are willing to tie the results of standardized tests to graduation requirements, and very few professors are willing to include the assessment as part of an existing course. No matter how the results turn out, there will always be complaints about the unknowability of student effort. The skepticism about the results hampers efforts to adopt real change based on the outcomes.

One potential innovative solution to this issue is to administer the exam as part of a required course that students could only take after all other GE requirements had been satisfied, with a stipulation that the exam count for at least 50% of the final grade. However, challenges of implementing this plan at UNC in terms of staffing and course credit hours alone are daunting. In sum, while there are some benefits to standardized exams at either the local or national level such as benchmark scoring and comparative groups, these are outweighed by the limitations identified.

Portfolios

Summary of major characteristics. Portfolios are a flexible tool for learning, teaching, and assessment. Portfolios are purposeful collections of student work, and they can illustrate student effort, progress, growth, development, and achievement as well as showcase students' best work (Holtzman, & Dagavarian, 2007). The advent of e-portfolios has alleviated some of the weaknesses of portfolios, making the use of portfolios in higher education more realistic (Goldsmith, 2007). An e-portfolio is a digitized collection of artifacts represented through a variety of formats including but not limited to text, graphics, or multimedia forms (Goldsmith). E-portfolios allow students to make connections between courses or content across their undergraduate educational experience, and provide the students with an opportunity to reflect "...on the many ways in which their college experiences have contributed to deep learning and overall growth" (Goldsmith, p. 66). This deep learning is what allows the students to see the intersectionality of courses across the general education curriculum. A number of colleges and universities use e-portfolios as some component of their assessment process; in 2012 it was reported that nearly 30% of responding universities reported 90-100% of their students using e-portfolios for course or programmatic assessment (Ring, Waugaman, Brackett, & Jackson, 2015).

Pros associated with method. Portfolios allow for student reflection, as well as opportunity for instructors to leave comments, notes, and/or feedback. Further, portfolios have the advantage of being used simultaneously for both individual and programmatic assessment. In fact, these strengths of the portfolio make it one of the most popular authentic assessments.

Because of the increase of e-portfolios for assessment, the Association of American Colleges and Universities (AACU) has explored the benefits of e-portfolios for both students and faculty. Miller and Morgaine (nd), in an AACU report, provide statements from students at the University of Michigan such as, "When I was trying to figure out what types of knowledge, skills, or abilities I had learned, it was very helpful to go to my e-portfolio and think about how

they applied to the experiences I was writing about” and “now I see patterns and themes in the work I have been doing, how things fit together.” This AACU report also addresses faculty perceptions, and one faculty is quoted, “If what we want is to deepen learning and to facilitate transfer of knowledge, for the first time, e-portfolios provide a strategy that allows students to archive their work over time.” Examination of the implementation of e-portfolios at other colleges and universities reveal similar themes. Goldsmith (2007) reports on the implementation of e-portfolios through the Connecticut Distance Learning Consortium and thirty-one institutional partners for a variety of learning and assessment purposes. Similar to the report from the AACU, both faculty and students report positive attributes of e-portfolios, with faculty making comments such as, “gave the students a chance to exercise reflective learning. The students were able to see their growth in different areas over time” (p. 36), and students stating that the e-portfolio “made me think about myself and what I was doing,” allowed the student to “store work related to a specific goal,” helped them make connections in that “I could group work and send it grouped,” helped them in “organizing thoughts and goals,” and “allows you to see how far you have advanced.” (p. 37).

Cons associated with method. There are weaknesses to portfolios including the time commitment to collecting and grading student artifacts, the need for a rubric to ensure objectivity of evaluation of artifacts, and a data and/or portfolio management system.

Reports on the implementation of e-portfolios provide information on the challenges of using e-portfolios for assessing general education outcomes. Faculty, staff, and students must learn a new software package and understand the approach to portfolios that the software was built upon (e.g., portfolios as developmental assessment or portfolios as showcase assessment). This requires training for all stakeholders, making sure faculty are trained separately from students so that faculty do not need to train students on using the e-portfolio while also teaching content and thinking skills. Second, e-portfolios emphasize self-assessment, reflection, and metacognition, and many incoming students lack the educational and cognitive sophistication that these skills require. Third, technological skills are important for the effective implementation of e-portfolios, and this can cause a problem for universities with a large number of adult learners, low-income students, or students from underprepared backgrounds. Fourth, the university must select a portfolio platform for data collection, and this can bring a number of unique challenges that may require a reflection of the university’s student, faculty, and staff characteristics, needs, available resources and services, and intents and purposes (Goldsmith). One faculty member in Goldsmith’s report noted that, “it is a challenge to get people to use the rich flexible tool as is rather than looking at it and finding reasons not to use it.” (p. 40).

Applicability to UNC context. When one combines the required extensive training necessary for implementing and using e-portfolios, the prerequisite familiarity with technology for effective use, and the parsimony of alternative assessment methods, e-portfolios may not be the best selection for use of assessing the general education curriculum at the University of Northern Colorado.

Course-Embedded Method

Summary of major characteristics. Course-embedded assignments for assessment of general education are utilized at many colleges and universities. The specific method varies, but generally professors identify a signature assignment that they are already using in their course that assesses the learning outcome(s) of interest. The professor gathers student artifacts from this signature assignment for data analysis of desired student learning outcomes. A rubric is created at the institution or adopted from a preexisting organization (e.g., VALUE rubrics created by the AACU). Student artifacts are scored, and results are provided to the relevant stakeholders to determine what, if any, actions are needed to improve student learning. There are two course-embedded methods.

Method 1. In one model, which is used at Southern Arkansas University (SAU) and Virginia Tech University, the course instructor scores the student artifacts. At SAU, for example, the assessment office loads the relevant AACU VALUE rubric into a LiveText account for the course instructor to make it easy for the instructor to record the assessment data at the same time he/she is grading the signature assignment. The goal at SAU is to gather data for each student and record this for purposes of longitudinal analysis tied to student assessment conducted in individual programs. At Virginia Tech, in part because of larger class sizes, individual instructors only record assessment data for a sampling of students, and no longitudinal studies are conducted.

Method 2. The other major model of course-embedded assessment has a scoring team made-up of faculty from across the university. The team scores a sample of student artifacts. Oklahoma State University (OSU) and Fort Lewis College (FLC) use this model. At OSU, faculty assessors are paid about \$2200 and meet during the summer to score student artifacts. There are teams of two faculty members who have a series of norming sessions. Then they assess about 75 student artifacts, applying the AACU VALUE rubrics. The faculty who assess artifacts from a particular discipline were specifically not from that discipline. The assessment team at FLC employed a similar model of recruiting faculty to score artifacts from outside their own discipline. FLC also uses the AACU VALUE rubrics.

Pros associated with method. The course-embedded model has several advantages. Because the assignments are already part of a course, the necessary stakes are there for students to do their best, thus yielding more reliable assessment data. There are no additional costs or time requirements for the students participating since they complete the assignment as part of the course. Faculty buy-in to participate in the assessment of their own course is potentially easier because they would already be assigning and grading those assignments.

Method 1 has the specific advantage of no additional cost for the assessment since participating faculty score the artifacts of their own students with a pre-existing assignment they already use in class. The data is gathered during the semester and can be analyzed much sooner than in Method 2. Method 1 also allows for every student to be assessed, yielding a much higher sample and thus more complete picture of how well students in the aggregate are hitting desired learning outcomes. In doing so there remains the possibility for longitudinal studies based on data gathered from the general education courses.

Method 2 has the advantage of potentially yielding more honest data. By having faculty who are not teaching the course and who are from a different discipline, the assessors are not tied in any way to the outcomes of the assessment data. Moreover, in theory, a student working on an assignment where critical thinking is being assessed in a history course should be able to demonstrate critical thinking outcomes to faculty members who are not in history and who would be unfamiliar with the material. Only Method 2 could ensure that sort of reliable data. The

faculty member whose course is being assessed does not have to do any additional work other than turning over the requisite number of student artifacts. Method 2 also represents a nice professional development opportunity for the faculty assessors who, through assessing students in other disciplines and through working with a team in the norming sessions, have the opportunity to learn about how other disciplines assess a variety of learning outcomes. As a result, this assessment process can also help build a stronger faculty community across disciplines.

Cons associated with method. The course-embedded model is far from perfect. Because it is focused on just one signature assignment, the data is a snapshot of how individual students are doing in a particular course. It cannot account for larger factors in students' lives or class schedules which may have hampered them on the particular assignment, thus challenging the reliability of the data. Moreover, students in general education courses are often at different stages of their college careers and thus have dramatically varying levels of the skills being assessed. Unlike the portfolio method, there is no opportunity for student reflection on the connections and value they may see of the various general education courses. And unlike the outside standardized exam, there may be no consistency in how students are assessed on a particular learning outcome that transcends disciplines and assignments.

Course-embedded assessment requires buy-in from faculty who might be suspicious that the data being gathered from their course will be used as part of an evaluation of them rather than as the basis for larger curricular reform. This suspicion could potentially lead to problems with the data gathered via Method 1. There is some fear that instructors, perhaps unwittingly, would assess their own students at a higher level of achievement than would outside faculty assessors. Beyond this, faculty buy-in is also complicated by the prospect that the assessment will result in more work for individual instructors, particularly if they have to navigate an assessment software system like LiveText, with which they may be unfamiliar. Method 2's cons comprise mostly more limited data and cost. Given the constraints of time, independent faculty teams at universities the size of UNC are most likely not able to assess all of the student artifacts from a particular course, thus eliminating any opportunity for more longitudinal analysis of student work. There is also the cost associated with hiring faculty to do the assessment and the delay of getting the necessary data (at least several months after the artifacts were first gathered).

Applicability to UNC context. The advantages of course-embedded assessment ultimately outweigh the downsides, particularly at an institution like UNC. Students have genuine stakes in performing well on the signature assignments being assessed since they are part of a course grade but without any additional cost or time commitment that would be associated with an outside standardized exam or portfolio. Of the two course-embedded methods surveyed here, Method 2 is the recommended option. Method 2 requires virtually no work on the part of faculty whose classes are being assessed since all they have to do is turn over a copy of their signature assignment and the requisite number of student artifacts. The faculty who participate as assessors will be independent of the course and presumably supporters of assessment in general. The professional development and remunerative incentives should attract ample faculty participants. The only downsides are the costs to the university (dependent on the size of the stipend to attract enough assessors), the delay in gathering the data, and the lack of comprehensive data. Given UNC's size, it will probably not be feasible to assess every learning outcome each year. Any assessment plan will most likely have to consist of a rotation of assessment learning outcomes. There will need to be consistent funding support from the university to fund faculty assessors. Still, this process has the potential to yield a lot of fruitful data that can inform the ways the disciplines think about the learning outcomes, as well as lead to

professional development workshops geared at generating new and better forms of signature assignments. Whatever method is used, UNC should take advantage of pre-existing rubrics (VALUE rubrics from AACU or the Colorado State Higher Education Council's gtPathways rubrics, for example) for the assessment. This will save much time and potential acrimony resulting from having to form committees to generate the many necessary rubrics for all of the core competencies and SLOs.

Sources Consulted to Research Course-Embedded Methods

The analysis of course-embedded general education assessment techniques was based on a review of publicly available documents and extensive conversations with assessment coordinators at the following institutions: Southern Arkansas University; Virginia Tech; Southern Methodist University; Oklahoma State University; University of Mississippi; Rochester Institute of Technology; Fort Lewis College; Wesleyan College; and the Association of American Colleges and Universities.

Conclusion and Recommendations

The purpose of this study was to collect information about how critical thinking is currently assessed in general education courses and to investigate general education assessment methods used by other institutions. The results provided valuable information to support the development of a pilot assessment of general education outcomes. Although not the primary purpose of the study, the results also raise questions the Liberal Arts Council may wish to consider in its general education reform efforts.

Recommendations for a Pilot Assessment

1. The pilot should use the gtPathways critical thinking learning outcomes and rubric (based on AAC&U's Critical Thinking VALUE Rubric). Until UNC finalizes learning outcomes for each LAC area, the gtPathways outcomes provide a consistent starting point for assessment. Using an existing rubric also decreases the time required to development a new rubric for the pilot.
2. The course-embedded method is a viable approach for a pilot. All faculty reported assessing critical thinking in their LAC classes, and about 60% of the submitted assignments assessed at least one gtPathways critical thinking outcome.
3. The pilot should be limited to written assignments. Written assignments were the most frequently reported method for assessing critical thinking across all courses. In addition, limiting the pilot to one assignment type will allow for greater validity in the results since we did not determine the validity of different assignment types in our study.
4. The pilot should be limited to only those outcomes that are most frequently assessed. Certain learning outcomes were less frequently assessed than others. This may have occurred because faculty were not provided with the specific learning outcome statements in advance or it may be that these outcomes are not currently being assessed across all courses. An alternative to limiting the pilot to fewer outcomes would be to collect multiple assignments from each faculty member to ensure that all outcomes are assessed in the pilot.
5. An assessment team of faculty from across disciplines should be recruited to score student artifacts. Based on our investigation of different assessment methods, this structure has several advantages, including minimizing time demands on faculty teaching

LAC courses, greater objectivity in scoring, and the ability to conduct training scoring and interrater reliability.

Additional Issues to be Considered by the Liberal Arts Council

1. Some additional research questions emerged from our study that the LAC may wish to investigate in the future. These include the following:
 - a. Are certain types of assignments better suited for assessing critical thinking across courses than others?
 - b. What is the relationship between poor writing and critical thinking outcomes?
 - c. What is the effect of class size on critical thinking outcomes?
2. We found that some outcomes are less frequently assessed than others. The LAC may wish to consider whether standards and expectations for assessing all outcomes are necessary.
3. Although we received a reasonably strong response rate, the majority of faculty did not complete the survey. The LAC may wish to consider developing requirements for faculty who teach LAC courses regarding their participation in assessment.
4. Our results showed that faculty are addressing multiple levels of learning in their LAC courses, which reflects a good understanding of how students learn. The LAC may wish to consider working with CETL or the Assessment Office to create professional development opportunities that expand on current good practice.
5. While consent is not required for using student artifacts for assessment purposes, the LAC may wish to consider adopting a statement to be included on syllabi or via other communications with students indicating that their work may be reviewed by other faculty for assessment purposes.

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Appendix: Survey Questions

In the questions below, we use the term methods to refer to the techniques or strategies faculty use to determine the extent to which students understand classroom concepts. Methods can include tests, exams, projects, in-class assignments, homework, and so on.

Part 1: Select **all** of the methods you use to assess **critical thinking** in your [Insert class name, piped in] class. If you use a method that doesn't fit in any of the categories, select other and describe the method.

- **Closed response method.** Any type of quiz, test, or assignment that has multiple choice, true/false, matching, checklist and the like.
- **Short written method, less than 1 page.** Method that requires students to demonstrate their learning by writing in less than 1 page. Could include short answer questions, short essay, and the like.
- **Medium and Long written method, longer than 1 page.** Method that requires students to demonstrate their learning by writing in more than 1 page. Could include essays, research papers, literature reviews, and the like.
- **Oral communication** (including presentations, debate, classroom discussion, and the like)
- **Mathematical or numerical method.** Method that requires students to demonstrate learning with numbers (for example, creating a budget, solving mathematical problems, and the like).
- **Graphical or pictorial representation.** Method that requires students to demonstrate learning with a graphical or pictorial representation (for example, a diagram, table, chart, and the like).
- **Other.** Please describe.
- **I don't assess critical thinking in this class.** [if this option is selected, use skip logic to take participant to end of survey]

Part 2: To help us better understand how critical thinking is assessed, we are collecting representative examples of the methods faculty use to assess critical thinking. For example, if you assess critical thinking with a short written assignment, then please copy and paste or upload a copy of the assignment you provide to students. Or if you assess critical thinking with a multiple-choice exam, please copy and paste or upload a copy of the exam. You will have the opportunity to share up to 3 methods.

Method 1

For your [Insert class name, piped in] class, please share a method you use to assess critical thinking. You can either paste it in the space below OR upload the method below.

Paste method in space below.

Or upload the method here. Only PDF, Word, and Excel formats can be uploaded. If your method is in a format other than the accepted formats, you can save the method as a PDF and upload it. If you have several documents related to the methods, you can either save them as one PDF and upload or you can save them as a zip folder and upload the zip folder. [provide mechanism for participant to upload method]

For the method you shared, please select all of the categories that best describe how this method assesses critical thinking.

- **Closed response method.** Any type of quiz, test, or assignment that has multiple choice, true/false, matching, checklist and the like.
- **Short written method, less than 1 page.** Method that requires students to demonstrate their learning by writing in less than 1 page. Could include short answer questions, short essay, and the like.
- **Medium and Long written method, longer than 1 page.** Method that requires students to demonstrate their learning by writing in more than 1 page. Could include essays, research papers, literature reviews, and the like.
- **Oral communication** (including presentations, debate, classroom discussion, and the like)
- **Mathematical or numerical method.** Method that requires students to demonstrate learning with numbers (for example, creating a budget, solving mathematical problems, and the like).
- **Graphical or pictorial representation.** Method that requires students to demonstrate learning with a graphical or pictorial representation (for example, a diagram, table, chart, and the like).
- **Other.** Please describe.

Do you have another example of the methods you use to assess critical thinking in your [Insert class name, piped in] class? [skip logic: if select yes, go to Method 2. If select no, go to end of survey]

- Yes
- No

Method 2

For your [Insert class name, piped in] class, please share a method you use to assess critical thinking. You can either paste it in the space below OR upload the method below.

Paste method in space below.

Or upload the method here. Only PDF, Word, and Excel formats can be uploaded. If your method is in a format other than the accepted formats, you can save the method as a PDF and upload it. If you have several documents related to the methods, you can either save them as one PDF and upload or you can save them as a zip folder and upload the zip folder. [provide mechanism for participant to upload method]

For the method you shared, please select all of the categories that best describe how this method assesses critical thinking.

- **Closed response method.** Any type of quiz, test, or assignment that has multiple choice, true/false, matching, checklist and the like.
- **Short written method, less than 1 page.** Method that requires students to demonstrate their learning by writing in less than 1 page. Could include short answer questions, short essay, and the like.
- **Medium and Long written method, longer than 1 page.** Method that requires students to demonstrate their learning by writing in more than 1 page. Could include essays, research papers, literature reviews, and the like.
- **Oral communication** (including presentations, debate, classroom discussion, and the like)
- **Mathematical or numerical method.** Method that requires students to demonstrate learning with numbers (for example, creating a budget, solving mathematical problems, and the like).
- **Graphical or pictorial representation.** Method that requires students to demonstrate learning with a graphical or pictorial representation (for example, a diagram, table, chart, and the like).
- **Other.** Please describe.

Do you have another example of the methods you use to assess critical thinking in your [Insert class name, piped in] class? [skip logic: if select yes, go to Method 3. If select no, go to end of survey]

- Yes
- No

Method 3

For your [Insert class name, piped in] class, please share a method you use to assess critical thinking. You can either paste it in the space below OR upload the method below.

Paste method in space below.

Or upload the method here. Only PDF, Word, and Excel formats can be uploaded. If your method is in a format other than the accepted formats, you can save the method as a PDF and upload it. If you have several documents related to the methods, you can either save them as one PDF and upload or you can save them as a zip folder and upload the zip folder. [provide mechanism for participant to upload method]

For the method you shared, please select all of the categories that best describe how this method assesses critical thinking.

- **Closed response method.** Any type of quiz, test, or assignment that has multiple choice, true/false, matching, checklist and the like.

- **Short written method, less than 1 page.** Method that requires students to demonstrate their learning by writing in less than 1 page. Could include short answer questions, short essay, and the like.
- **Medium and Long written method, longer than 1 page.** Method that requires students to demonstrate their learning by writing in more than 1 page. Could include essays, research papers, literature reviews, and the like.
- **Oral communication** (including presentations, debate, classroom discussion, and the like)
- **Mathematical or numerical method.** Method that requires students to demonstrate learning with numbers (for example, creating a budget, solving mathematical problems, and the like).
- **Graphical or pictorial representation.** Method that requires students to demonstrate learning with a graphical or pictorial representation (for example, a diagram, table, chart, and the like).
- **Other.** Please describe.

Part 3.

Please share any additional thoughts about assessing critical thinking in your class.

Part 4. Demographic Question

Including the current semester, approximately how many times have you taught [Piped course name] course?

Appendix: Rubric to Score Assignments

Rubric 1

Does the assignment show evidence of students demonstrating the GtPathways critical thinking learning outcomes?

Each assignment was evaluated to determine if it required students to show evidence of their learning related to the GtPathways critical thinking learning outcomes required for the LAC area.

GtPathways Critical Thinking Learning Outcomes and LAC Areas Required to Cover the Outcomes	Scoring Criteria
	<ul style="list-style-type: none"> • 0-No, there was no evidence students demonstrate this learning in the assignment. • 1-Yes, there was evidence students demonstrate this learning in the assignment.
1. Explain an Issue (required for LC3C, LC5A, LC5B & LC5C)	
a. Use information to describe a problem or issue and/or articulate a question related to the topic.	
2. Utilize Context (required for LC3A, LC3B, LC3C, LC5A, LC5B & LC5C)	
a. Evaluate the relevance of context when presenting a position.	
b. Identify assumptions.	
c. Analyze one’s own and others’ assumptions.	
3. Formulate an Argument (required for LC4)	
a. Ask a question relevant to the discipline.	
b. Synthesize perspectives that answer it	
4. Incorporate Evidence (required for LC4)	
a. Interpret/evaluate sources to develop an analysis or synthesis.	
5. Understand Implications and Make Conclusions (required for LC3A, LC3B, LC3C, LC4, LC5A, LC5B & LC5C)	
a. Establish a conclusion that is tied to the range of information presented.	
b. Reflect on implications and consequences of stated conclusion.	

Rubric 2

What level of Bloom's Taxonomy is demonstrated by the assignment?

Overview of Bloom's Taxonomy

Bloom’s taxonomy of educational outcomes (Bloom, Englehart, Furst, Hill, & Krathwohl, 1956) provides a framework that allows educators to focus on a more differentiated set of outcomes than simply “learning”. The taxonomy is presented as a pyramid moving from memory, to comprehension, application, analysis, synthesis, and evaluation, thus pointing out that there are learning outcomes that go beyond the repetition of behavior (Schwartz & Goldstone, 2016). Though the presentation of the taxonomy might indicate that previous levels of the pyramid are necessary requisites for higher levels, that is not an accurate representation of Bloom’s taxonomy. As Schwartz and Goldstone purport, learning is a coordination of multiple

categories distributed across our cognitive processing. While it may seem counterintuitive for an introductory liberal arts core to instruct and assess at a higher level of Bloom's taxonomy (e.g., evaluation), this is actually indicative of a faculty member's understanding of the coordinated nature of learning.

Each assignment was evaluated to determine the level of learning demonstrated using Bloom's Taxonomy. The entire assignment was evaluated and a score was given based on the highest level of learning found in the assignment.

Scoring Criteria

- 0=Not relevant. This option is selected when none of the critical thinking learning outcomes were present in the assignment.
- 1= Remembering: Exhibit memory of previously learned material by recalling facts, terms, basic concepts, and answers.
- 2= Understanding: Demonstrate understanding of facts and ideas by organizing, comparing, translating, interpreting, giving descriptions, and stating main ideas.
- 3= Applying: Solve problems to new situations by applying acquired knowledge, facts, techniques and rules in a different way.
- 4=Analyzing: Examine and break information into parts by identifying motives or causes. Make inferences and find evidence to support generalizations.
- 5=Evaluating: Present and defend opinions by making judgments about information, validity of ideas, or quality of work based on a set of criteria.
- 6=Creating: Compile information together in a different way by combining elements in a new pattern or proposing alternative solutions.