



UNIVERSITY OF
TEXAS
ARLINGTON

INSTITUTIONAL EFFECTIVENESS AND REPORTING

**ASSESSMENT OF CRITICAL THINKING USING THE AAC&U VALUE RUBRIC
AT THE UNIVERSITY OF TEXAS AT ARLINGTON**

SPRING 2015 REPORT

Assessment of Critical Thinking Using the AAC&U Value Rubric
at The University of Texas at Arlington

Critical Thinking has been widely identified as a personal practice of self-disciplined exploration of information that uses analytical reasoning to reflect on the ideas presented, followed by the formation and evaluation of possible conclusions (Rhodes, 2010). Critical Thinking is one of the six Texas Core Curriculum Objectives defined by the Texas Higher Education Coordinating Board (THECB, 2013). Educators typically use student assignments that involve analysis and summarization of ideas or data to assess Critical Thinking. In this report, evidence of Critical Thinking was measured from written samples of student work that were completed as part of undergraduate Core Curriculum courses at The University of Texas at Arlington (UT Arlington). Specific Signature Assignments were developed by each department. The presence of Critical Thinking in the assignment was assessed using a well-vetted rubric developed by the Association of American Colleges and Universities ([AAC&U](#); Rhodes, 2010). The purpose of this report is to present findings from the assessment of Critical Thinking during the 2015 spring semester at UT Arlington.

UT Arlington's assessment plan stipulates that all six Texas Core Curriculum Objectives must be assessed in each of the eight Foundational Component Areas (FCA) defined by THECB within a [multi-year schedule](#). Thus, the assessment plan was organized by Core Objective for each FCA. While some of the Texas Core Curriculum Objectives, as defined by THECB, link to a subset of FCAs, Critical Thinking is required for all areas and is therefore scheduled for assessment in each one. This spring 2015 Critical Thinking Report contains a summary of the data collected from the Mathematics FCA.

Method

Participants

Written samples of the Signature Assignment were collected from forty-six students who were enrolled in UT Arlington undergraduate courses that were designated as part of the Core Curriculum. Each sample was rated by a team of trained faculty. A majority of the student participants were female (91%; $n = 42$). The racial and ethnic composition of the participants was primarily White or Hispanic (88%, $n = 40$), evenly split between the two groups (44%, $n = 20$). The 6 remaining students were from the following groups: 2% African American ($n = 1$), 2% Asian ($n = 1$), and 9% other ($n = 4$). Most students in the sample were from the College of Education, but five of UT Arlington's ten colleges and schools were represented (see Table 1).

Table 1
College/School Breakdown of Students

College/School	Number of Students (Percent)
Education	40 (87%)
Liberal Arts	2 (4%)
University College	2 (4%)
Business	1 (2%)
Science	1 (2%)
Architecture	0 (0%)
Engineering	0 (0%)
Nursing and Health Innovation	0 (0%)
Social Work	0 (0%)
Urban and Public Affairs	0 (0%)

Procedure

Undergraduate students who were enrolled in a 1000-level mathematics course in the spring 2015 semester completed a Signature Assignment approved by the UT Arlington Core Curriculum Committee. These assignments, nominated by Department Chairs from the FCA for rating, serve as purposeful evidence of the level of mastery of a core objective such as Critical Thinking for the

course. The Signature Assignment directed the students to complete a written data-analysis report that included both visual and written elements. Specifically, participants were provided with a dataset consisting of students' grades and were instructed to use their mathematical knowledge to represent the data visually in one or more meaningful formats. In addition, they described their analyses in narrative format and discussed real-world scenarios such as how they would explain their grading practices to another classroom teacher. After completion, student samples for the assignment were collected from the department. Papers were assigned a tracking number and then any personal identification information (e.g., the student's name) was redacted from the paper in preparation for Scoring Day.

Assessment Instrument

The assessment instrument used in this report was the AAC&U Critical Thinking Rubric (AAC&U, 2015). These Valid Assessment of Learning in Undergraduate Education (VALUE) Rubrics were developed by a multi-disciplinary team of faculty experts directed by the AAC&U. The Critical Thinking Rubric is organized into five dimensions: 1) *Explanation of issues*, 2) *Evidence*, 3) *Influence of context and assumptions*, 4) *Student's position*, and 5) *Conclusions and related outcomes*. The rubric contains a table that provides a narrative description of the expected quality of work and corresponding point values for scoring the five dimensions (see Figure 1). The point values ranged from 1 - 4 with 4 representing the highest mastery of Critical Thinking. Raters assigned a score for each dimension.

Raters, Rater Calibration, and Scoring

We recruited raters for scoring the Signature Assignments from among the UT Arlington academic community. The ratings were completed in a group setting on Scoring Day. Assignment of a code number to each rater allowed us to track the papers rated by each person and ensured their

CRITICAL THINKING VALUE RUBRIC

for more information, please contact valuel@aacu.org



Definition

Critical thinking is a habit of mind characterized by the comprehensive exploration of issues, ideas, artifacts, and events before accepting or formulating an opinion or conclusion.

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

	Capstone 4	3	Milestones 2	Benchmark 1
Explanation of issues	Issue/problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or backgrounds unknown.	Issue/problem to be considered critically is stated without clarification or description.
Evidence <i>Selecting and using information to investigate a point of view or conclusion</i>	Information is taken from source(s) with enough interpretation/evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Figure 1. AAC&U Critical Thinking VALUE Rubric

anonymity in the final dataset. Using the rubric, student work samples were rated by faculty and staff with advanced degrees. Two steps were followed. First, the raters gathered on Scoring Day and completed a training/rater-calibration process before any student work samples were scored. For example, after listening to a trainer present and describe the process, three samples of student work were used as anchor papers in the hands-on rater calibration process. During this step, based on the five dimensions of the rubric, all of the raters used the anchor papers as exemplars to facilitate discussion aimed at reaching a common understanding of Critical Thinking.

Next, the actual scoring process began. Each paper was assigned to a minimum of two raters and each one scored the paper using the rubric. If the values of the dimension scores for a paper from the two raters were identical or within two points, then the scores were averaged. For example, if Rater A scored the Evidence dimension with a value of 2 and Rater B scored Evidence with a value of 4, then the score for that dimension was averaged, resulting in a score value of 3. If the scores from the two raters differed by more than two points, then a third rater was assigned the paper. Then, from the three scores, the two most similar scores were averaged together and the third was dropped. Figure 2 contains the rater score sheet.

	Grader 1 _____				Grader 2 _____				Grader 3 _____ (only if needed)			
Explanation of the issues	4	3	2	1	4	3	2	1	4	3	2	1
Evidence	4	3	2	1	4	3	2	1	4	3	2	1
Influence of context and assumptions	4	3	2	1	4	3	2	1	4	3	2	1
Student's position	4	3	2	1	4	3	2	1	4	3	2	1
Conclusions and related outcomes	4	3	2	1	4	3	2	1	4	3	2	1

Figure 2. Rater Score Sheet

Analysis and Results

Frequencies were used to examine students' Critical Thinking skills (see Table 2). The small sample size prevented inferential statistical analyses, however several highlights emerged from the scores. Students scored highest in *Evidence* and *Explanation of issues*. Students scored lower in the other three dimensions.

Table 2

Overall Results of Critical Thinking Assessment

Critical Thinking Dimensions	Score Frequency (Percent)			
	4	3	2	1
Explanation of the Issues	5 (11%)	14 (30%)	23 (50%)	4 (9%)
Evidence	1 (2%)	21 (46%)	23 (50%)	1 (2%)
Influence of Context and Assumptions	3 (7%)	12 (26%)	28 (61%)	3 (7%)
Student's Position	3 (7%)	7 (15%)	32 (70%)	4 (9%)
Conclusions and Related Outcomes	0 (0%)	12 (26%)	28 (61%)	6 (13%)

Inter-rater Agreement

In order to evaluate the effectiveness of the assessment process, inter-rater agreement analysis was conducted to see how frequently the two raters agreed on scoring. The inter-rater agreement level was determined by calculating the intra-class correlation coefficient (ICC). High ICC values indicate more agreement between rater scores. Commonly accepted guidelines were used to interpret the ICC results. These suggest that the range of 0.40 to 0.74 is considered fair to good inter-rater agreement, with results above 0.74 classified as excellent inter-rater agreement, and results lower than .40 considered poor inter-rater agreement (Fleiss, 1986; Shrout & Fleiss, 1979).

The ICC value for *Explanation of Issues* was within the range for fair to good inter-rater agreement ($ICC = .42$). The dimension with the second highest ICC value was *Influence of context*

and assumptions ($ICC = .29$). However, for this sample, the ICC values for 4 of the 5 dimensions indicated poor inter-rater agreement.

Summary

The current assessment of Signature Assignments used the AAC&U Critical Thinking VALUE rubric. Results revealed a pattern of strengths and weaknesses for a sample of undergraduate students. The student scores were stronger for the dimensions of *Explanation of issues* and *Evidence*. The scores for this group of students were weaker for the dimensions of *Influence of context and assumptions*, *Student's position*, and *Conclusions and related outcomes*.

Limitations

Several limitations of this report are important to note. One involved the size of the sample; the small number of participants limited the analytical approaches that could be used to examine this assessment. In addition, the sample was not representative of the diversity of the campus population at UT Arlington. Most of the students were females from the School of Education. Further, the raters encountered scoring issues with this specific assignment. The theme that emerged from the post-scoring discussion with the raters was that many struggled with the alignment of the assignment to the rubric. Some recommended the selection of a different assignment for future assessment sessions. In contrast, several raters found the rubric helpful and requested a copy for future use when creating new assignments.

Overall, this initial assessment of the THECB Critical Thinking Core Objective was exploratory in nature. Future studies will continue to examine trends in student performance related to Critical Thinking skills among undergraduate students at UT Arlington. This report contains but one of the eight Foundational Component Areas that the multi-year plan to assess Critical Thinking at UT Arlington will encompass when completed in 2017.

References

- Association of American Colleges and Universities (2015). Critical Thinking VALUE rubric. Retrieved on 11/09/2015 from <https://www.aacu.org/value/rubrics/critical-thinking>
- Fleiss J. L. (1986). *The design and analysis of clinical experiments*. New York: John Wiley & Sons.
- Lederman, D. (2015). Are they learning? New effort aims to standardize faculty-driven review of student work. *Inside Higher Ed*. Retrieved on 11/13/2015 from <https://www.insidehighered.com/news/2015/09/25/new-effort-aims-standardize-faculty-driven-review-student-work>.
- Rhodes, T. (Ed.). (2010). *Assessing outcomes and improving achievement: Tips and tools for using rubrics*. Washington, DC: Association of American Colleges and Universities.
- Shrout, P., & Fleiss, J. L. (1979). Intraclass correlation: uses in assessing rater reliability. *Psychological Bulletin*, 86(2), 420–428.