Analysis of Artifacts aligned to Marshall's Baccalaureate Degree Profile (BDP)

Academic Year 2020 – 2021

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Executive Summary

Background

Recommendations from the 2020 Assessment Team

The Summer Assessment Team made the following recommendations:

1. That the Baccalaureate Degree Profile outcomes be reconfigured in Blackboard to allow instructors to align each assignment to individual outcome traits. Chris Sochor, Instructional Designer in Online Learning, said that it is possible to do this. The rationale for this recommendation is that it will focus instructors more closely on the specific elements (and definitions) of each outcome. Aligning to traits rather than holistically to an outcome should reduce the number of artifacts that assessors judge to lack specific outcome trait alignment. This recommendation was not implemented.
2. That faculty be reminded to have students upload *final* versions of *summative* assignments for assessment. This recommendation was implemented.

3. That we use Microsoft Teams (rather than Blackboard Organizations) to communicate general education assessment information to specific constituencies. A special emphasis during 2020-2021 will be to communicate with faculty the need to align assignments to outcome traits. We will include the definitions of all outcome traits. We used Microsoft Teams, but did not follow up with the suggestion that faculty align to specific rubric traits.
4. If recommendations 1 and 3 are not accomplished, consider having the Summer Assessment Team review all assignments that will be part of its reviews before beginning to score artifacts to determine the appropriateness of these assignments to each outcome trait. This recommendation was implemented.
5. That we communicate the results of general education assessment and recommendations of the Summer Assessment Team to the General Education Council. Perhaps due to the pandemic, the General Education Council did not meet during academic year 2020-2021.
6. That we examine the mapping of degree program outcomes to those of Marshall's Baccalaureate Degree Profile (BDP). These data are currently being collected in Taskstream and the Office of Assessment and Quality Initiatives will analyze the mappings completed to date and continue to work with degree programs that have not completed the mappings. Approximately 60% of undergraduate programs have completed this mapping. A complete university-wide analysis has not been completed.
7. Use the analysis from recommendation 6 to recommend possible modifications to BDP traits. This recommendation has not been completed.

Procedures for 2021 Assessment

General Procedures

In May 2021 we evaluated student artifacts produced in response to course assignments aligned to *Creative Thinking*, *Inquiry-Based Thinking*, and *Quantitative Thinking*. A group of eight faculty representing several academic colleges from across the university evaluated a sample of these artifacts using rubrics adapted from Marshall's Baccalaureate Degree Profile outcomes and the AAC&U Value Rubrics. These rubrics are included in the supporting documentation. Our sample initially consisted of 384 artifacts, 128 per outcome.

Prior to beginning our assessment, we examined results from our last university-wide assessment of these outcomes. During that assessment we used two rubrics for each of the artifacts aligned to *Creative Thinking* (Marshall' University's rubric and the AAC&U Creative Thinking Value Rubric); *Inquiry-Based Thinking* (Marshall University's rubric and the AAC&U Critical Thinking Value Rubric), and *Quantitative Thinking* (Marshall University's rubric and the AAC&U Quantitative Literacy Value Rubric). Based on findings from that assessment regarding which rubrics worked best in terms of differentiating performance between 100/200 and 300/400 level courses and which rubrics had the highest percentage of alignment with artifacts, we designed the three rubrics we used for this assessment. Please refer to supporting documentation for more information about the rubrics we used. Next, we spent a day reviewing all assignments aligned to the three outcomes to determine if there were assignments that either did not align to the outcome in question or did not align to one or more traits. Assignments that reviewers agreed did

not align to the outcome were removed from the sample and reviewers were instructed to note the traits to which each assignment that remained in the sample did not align and to assign these artifacts scores of N/A for those traits. The following chart shows that total number of assignments that aligned to each trait of each outcome and the total number of artifacts that received scores.

Outcome	Trait (MU rubric)	Total Assignments Aligned	Total Artifacts Aligned
Creative Thinking	Ambiguities/Possibilities/Problem	2	50
	Risk Taking	4	88
	Integrative Thinking	6	91
	Synthesizing/Connecting/Transforming	6	93
Total for Creative Thinking		**18**	**322**
Inquiry-Based Thinking	Problem/Question/Issue	29	103
	Research of Existing Knowledge/Evidence	23	79
	Data Collection and Analysis/Student's Position	30	119
	Conclusions and Related Outcomes	30	113
Total for Inquiry-Based Thinking		**112**	**414**
Quantitative Thinking	Context	9	102
	Interpretation	9	97
	Representation	7	68
	Calculation	8	100
	Application/Analysis	9	92
Total for Metacognitive Thinking		**42**	**459**
Totals		**172**	**1,195**

Each artifact was read by two independent reviewers. This project was coordinated by the Office of Assessment and Quality Initiatives.

Scoring Procedures

Evaluators assessed each artifact using the following scale:

Special Scoring Codes	
Score	**Explanation**
0	In the opinion of the evaluator, the evaluator saw no evidence of the trait in the student's work. Note: When two reviewers agreed on scores of "0," or when this score was confirmed by a third (or fourth) reviewer, the score was dropped from the final analysis.
Regular Scoring Codes These codes were given to artifacts that, in the opinion of the evaluator, were aligned with appropriate outcomes/traits and contained enough information to allow assessment.	
1	The artifact demonstrated Level 1 performance.
2	The artifact demonstrated Level 2 performance.
3	The artifact demonstrated Level 3 performance.
4	The artifact demonstrated Level 4 performance.

Please see the supporting information that follows this summary for a detailed explanation of scoring procedures.

General Information about the Sample

Three hundred fifty-eight (358; 93%) of the artifacts in our sample were drawn from courses at the 100/200 level, with the remaining 26 (7%) drawn from courses at the 300/400 level.

Results and Analysis

Results based on course level were as follows:

Creative Thinking				**Inquiry-Based Thinking**				**Quantitative Thinking**			
Trait	Course Level	Number	Mean (SD)	**Trait**	Course Level	Number	Mean (SD)	**Trait**	Course Level	Number	Mean (SD)
Ambiguities/ Possibilities/ Problem	100/200	50	1.49 (0.59)	**Problem/ Question/ Issue**	100/200	90	1.96 (0.58)	**Context**	100/200	95	2.00 (0.58)
	300/400	0	N/A		300/400	13	2.65 (0.97)		300/400	7	2.36 (0.38)
Risk Taking	100/200	88	1.89 (0.76)	**Research of Existing Knowledge/ Evidence**	100/200	66	1.89 (0.60)	**Interpretation**	100/200	90	2.29 (0.73)
	300/400	0	N/A		300/400	13	2.54 (0.69)		300/400	7	2.57 (0.61)

Creative Thinking				Inquiry-Based Thinking				Quantitative Thinking			
Innovative Thinking	100/200	91	1.84 (0.68)	**Data Collection and Analysis/ Student's Position**	100/200	105	1.92 (0.60)	**Representation**	100/200	62	2.08 (0.77)
	300/400	0	N/A		300/400	14	2.57 (0.78)		**300/400**	6	2.67 (0.26)
Synthesizes/ Connects/ Transforms	100/200	93	1.78 (0.69)	**Conclusions and Related Outcomes**	100/200	100	2.05 (0.59)	**Calculation**	100/200	94	2.24 (0.74)
	300/400	0	N/A		300/400	13	2.69 (0.69)		300/400	6	2.50 (0.32)
								Application/Analysis	100/200	84	2.24 (0.64)
									300/400	8	2.38 (0.35)

For all traits of *Inquiry-Based* and *Quantitative Thinking*, students enrolled in courses at the 300/400 level had higher mean scores than did students enrolled in courses at the 100/200 level. Mean differences for *Inquiry-Based Thinking* were statistically significant for all traits, but the only *Quantitative Thinking* trait that reached statistical significance was representation. We note that only 7% of the artifacts assessed were from students enrolled in courses at the 300/400 level and that no artifact aligned to *Creative Thinking* was from a 300/400 level course.

A perusal of the chart above shows mean performance for artifacts uploaded from 100/200 level courses ranged from 1.49 for *Creative Thinking*: ambiguities/possibilities/problem to 2.29 for *Quantitative Thinking*: interpretation. Means for 300/400 level courses ranged from 2.36 for Quantitative Thinking: context to 2.6 for *Inquiry-Based Thinking*: conclusions and related outcomes. Student performance on artifacts aligned to *Inquiry-Based* and *Quantitative Thinking* was stronger than was their performance on artifacts aligned to *Creative Thinking*.

Frequency Analysis

Creative Thinking					Inquiry-Based Thinking					Quantitative Thinking				
Trait	**Course Level**	**% Scoring 3.5 to 4.0**	**% Scoring 2.5 to 4.0**	**% Scoring 1.5 to 4.0**	**Trait**	**Course Level**	**% Scoring 3.5 to 4.0**	**% Scoring 2.5 to 4.0**	**% Scoring 1.5 to 4.0**	**Trait**	**Course Level**	**% Scoring 3.5 to 4.0**	**% Scoring 2.5 to 4.0**	**% Scoring 1.5 to 4.0**
Possibilities	100/200	0%	14%	56%	**Issue**	100/200	0%	38%	84%	**Context**	100/200	0%	39%	89%
	300/400	N/A	N/A	N/A		300/400	31%	77%	85%		300/400	0%	57%	100%
Risk	100/200	3%	34%	74%	**Evidence**	100/200	0%	30%	83%	**Interpretation**	100/200	8%	51%	91%
	300/400	N/A	N/A	N/A		300/400	23%	69%	100%		300/400	0%	71%	100%
Innovation	100/200	0%	36%	74%	**Position**	100/200	0%	30%	85%	**Representation**	100/200	2%	47%	77%
	300/400	N/A	N/A	N/A		300/400	21%	71%	100%		300/400	0%	100%	100%
Synthesis	100/200	1%	28%	78%	**Conclusion**	100/200	2%	39%	91%	**Calculation**	100/200	3%	47%	86%
	300/400	N/A	N/A	N/A		300/400	23%	77%	100%		300/400	0%	83%	100%
Overall	100/200	**1%**	**30%**	**72%**	**Overall**	100/200	**1%**	**35%**	**86%**	**Analysis**	100/200	1%	56%	90%

Creative Thinking					Inquiry-Based Thinking					Quantitative Thinking				
	300/400	**N/A**	**N/A**	**N/A**		300/400	**25%**	**74%**	**96%**		300/400	0%	63%	100%
										Overall	100/200	**3%**	**48%**	**88%**
											300/400	**0%**	**74%**	**100%**

While the number of artifacts from 300/400 level courses was small (13-14 for each trait of *Inquiry-Based Thinking* and 6-8 for each trait of *Quantitative Thinking*), 74% of students who completed artifacts from these courses scored between 2.5 and 4.0 and 25% scored between 3.5 and 4 in *Inquiry-Based Thinking*. We note final scores of 2.5 indicate that at least one rater scored the trait at level 3; for traits with a final score of 3.5 at least one rater scored the trait at level 4.

When considering artifacts aligned *Creative*, *Inquiry-Based*, and *Quantitative Thinking* from 100/200 level courses, 72%, 86%, and 88% of students scored between 1.5 and 4.0, respectively. This finding means that, at minimum, at least one rater assigned a score of 2 to the rubric trait.

Results for Course Type

Analyzing results by course type posed several challenges. Courses can have the other attributes analyzed this year (Critical Thinking [CT], Writing Intensive [WI], Core II, Capstone, First Year Seminar in Critical Thinking [FYS] and Honors) in combination (and many do). So, when analyzing results by course type, we included all courses with the attribute we wanted to assess; this resulted in some courses being included in the analysis for more than one course type.

Critical Thinking (CT) Courses

CT courses in the assessment sample included those that aligned to each of the outcomes assessed. All CT courses are at the 100/200 level. Results are below:

Creative Thinking			Inquiry-Based Thinking			Quantitative Thinking		
Trait	**Number**	**Mean (SD)**	**Trait**	**Number**	**Mean (SD)**	**Trait**	**Number**	**Mean (SD)**
Possibilities	42	1.36 (0.46)	**Issue**	70	2.01 (0.56)	**Context**	95	2.00 (0.58)
Risk	81	1.88 (0.76)	**Evidence**	45	1.97 (0.58)	**Interpretation**	90	2.29 (0.73)
Innovation	83	1.80 (0.67)	**Position**	84	1.99 (0.58)	**Representation**	62	2.08 (0.76)

Creative Thinking			Inquiry-Based Thinking			Quantitative Thinking		
Synthesis	85	1.76 (.68)	**Conclusion**	82	2.05 (0.58)	**Calculation**	94	2.24 (0.74)
						Analysis	84	2.24 (0.64)

While, due to the relatively small /*n*/s, the results should be interpreted with caution, mean scores for students in Marshall's CT courses (which are at the 100 and 200 level) suggest performance at level 2 or higher on all traits of *Quantitative Thinking*, at about level 2 on all traits of *Inquiry-Based Thinking*, and approaching level 2 on three of the four traits of *Creative Thinking*. *Creative Thinking's* first trait (ambiguities/possibilities/problem) is the trait to which the fewest artifacts aligned and the trait with the lowest overall performance.

Core II Courses

Core II courses in the assessment sample included those that aligned to each of the outcomes assessed. All Core II courses are at the 100/200 level, and many are also CT courses. Results are below:

Creative Thinking			Inquiry-Based Thinking			Quantitative Thinking		
Trait	**Number**	**Mean (SD)**	**Trait**	**Number**	**Mean (SD)**	**Trait**	**Number**	**Mean (SD)**
Possibilities	42	1.36 (0.46)	**Issue**	59	1.97 (0.56)	**Context**	54	1.89 (0.56)
Risk	81	1.88 (0.76)	**Evidence**	35	1.91 (0.54)	**Interpretation**	51	2.11 (0.64)
Innovation	74	1.85 (0.66)	**Position**	75	1.88 (0.53)	**Representation**	57	2.07 (0.75)
Synthesis	76	1.77 (0.71)	**Conclusion**	73	1.95 (0.51)	**Calculation**	59	2.14 (0.71)
						Analysis	45	2.13 (0.64)

While, due to the relatively small /*n*/s, the results should be interpreted with caution, mean scores for students in Marshall's Core II courses (which are all at the 100 and 200 level) suggest performance at level 2 or higher for most traits of *Quantitative Thinking* and performance approaching level 2 for all traits of *Inquiry-Based Thinking* and for most traits of *Creative Thinking*.

Multicultural (MC) Courses

MC courses in the assessment sample aligned to two outcomes assessed: *Creative Thinking* and *Inquiry-Based Thinking.* All MC artifacts came from 100/200 level courses. Results are given below:

Creative Thinking			**Inquiry-Based Thinking**		
Trait	**Number**	**Mean (SD)**	**Trait**	**Number**	**Mean (SD)**
Possibilities	N/A	N/A	**Issue**	42	1.93 (0.53)
Risk	34	2.15 (0.73)	**Evidence**	18	1.94 (0.57)
Innovation	1	1.50 (N/A)	**Position**	58	1.93 (0.51)
Synthesis	1	1.00 (N/A	**Conclusions**	56	1.90 (0.53)

While, due to the relatively small /*n*/s, the results should be interpreted with caution, mean scores for students in Marshall's MC courses suggest performance at least approaching level 2 for all traits of *Inquiry-Based Thinking*. Mean score for risk-taking, the second trait of *Creative Thinking* had a mean score putting it well into level 2 performance. *Creative Thinking's* other traits had too few artifacts (one or zero) to draw any conclusions.

International (INT) Courses

The few INT courses included in this assessment sample only aligned to three traits of *Creative Thinking*. All were drawn from courses at the 100/200 level. Results are below:

Creative Thinking		
Trait	**Number**	**Mean (SD)**
Possibilities	N/A	N/A
Risk	6	1.67 (0.68)
Innovation	5	1.50 (0.61)
Synthesis	7	1.50 (.76)

Mean scores hover between levels 1 and 2, but the extremely low /n/ makes it impossible to draw conclusions.

Writing Intensive (WI) Courses

WI courses in the assessment sample aligned to two outcomes assessed: *Creative Thinking* and *Inquiry-Based Thinking.* All artifacts aligning to *Creative Thinking* were drawn from 100/200 level courses, but ten artifacts aligning to *Inquiry-Based Thinking* came from 300/400 level courses. Results are given below:

Creative Thinking			**Inquiry-Based Thinking**			
Trait	Number	Mean (SD)	Trait	Course Level	Number	Mean Score
Possibilities	42	1.36 (0.46)	**Issue**	100/200	35	2.01 (0.60)
				300/400	10	2.95 (0.83)
Risk	41	1.68 (0.74)	**Evidence**	100/200	24	2.00 (0.53)
				300/400	10	2.50 (0.78)
Innovation	51	1.74 (0.65)	**Position**	100/200	39	1.97 (0.58)
				300/400	10	2.70 (0.82)
Synthesis	51	1.73 (0.68)	**Conclusions**	100/200	39	2.04 (0.54)
				300/400	10	2.80 (0.68)

While, due to the relatively small /*n*/s, the results should be interpreted with caution, mean scores for students in Marshall's WI courses suggest performance between levels 1 and 2 for all traits of *Creative Thinking*, at level 2 for 100/200 level courses for all traits of *Inquiry-Based Thinking*. Performance in 300/400 level courses was between levels 2 and 3 for all traits of *Inquiry-Based Thinking*, approaching level 3 for at least one trait; problem/question/issue.

Honors Courses

Honors courses in the assessment sample, all of which were at the 100/200 level, aligned to *Creative Thinking* and to *Inquiry-Based Thinking*. Results are given below:

Creative Thinking			**Inquiry-Based Thinking**		
Trait	Number	Mean (SD)	Trait	Number	Mean Score
Possibilities	8	2.19 (0.75)	**Issue**	11	1.96 (0.69)
Risk	7	2.00 (0.76)	**Evidence**	9	2.06 (0.63)
Innovation	17	2.32 (0.68)	**Position**	14	2.11 (0.74)
Synthesis	17	2.18 (0.75)	**Conclusions**	13	2.39 (0.46)

While, due to the relatively small /*n*/s, the results should be interpreted with caution, mean scores for students in Marshall's 100/200 level Honors courses suggest performance at level 2 or higher in all traits of *Creative* and *Inquiry-Based Thinking*.

FYS Courses

FYS courses in the assessment sample aligned to *Creative Thinking* and to *Inquiry-Based Thinking.* Please note that all FYS artifacts linked to *Creative Thinking* were from an Honors section. Results are given below:

Creative Thinking			**Inquiry-Based Thinking**		
Trait	**Number**	**Mean (SD)**	**Trait**	**Number**	**Mean (SD)**
Possibilities	8	2.19 (0.75)	**Issue**	18	1.78 (0.62)
Risk	7	2.00 (0.76)	**Evidence**	19	1.71 (0.65)
Innovation	8	2.25 (0.71)	**Position**	19	1.66 (0.60)
Synthesis	8	2.00 (0.68)	**Conclusion**	16	2.06 (0.70)

While, due to the relatively small /*n*/s, the results should be interpreted with caution, mean FYS scores that aligned to *Creative Thinking* were all at level 2. We note that these artifacts were from Honors sections of FYS. Artifacts aligned to *Inquiry-Based Thinking* were drawn from a mix or regular and Honors sections and mean scores range from 1.66 to 2.06, suggesting that these first-year students are making nice progress in their studies at Marshall.

Capstone Courses

There were four capstone papers in this sample, and all were aligned to *Inquiry-Based Thinking*.

Trait	**Number**	**Mean Score (SD)**
Issue	4	3.25 (0.65)
Evidence	4	2.63 (0.63)
Position	4	3.13 (0.75)
Conclusions	4	3.25 (0.65)

Due to /*n*/s of only four, the results should be interpreted with caution; however, mean scores for students in the capstone sample suggest performance between Levels 3 and 4 for all traits of *Inquiry-Based Thinking* except for trait 2, research of existing knowledge/evidence.

Conclusion

We used rubrics this year that measured student performance according to the level of sophistication they demonstrated in achievement of each trait of the three Baccalaureate Degree Profile (BDP) outcomes we assessed. BDP outcomes specify what students are expected to achieve at the time they receive their baccalaureate degrees. Admittedly, the proportion of artifacts from 300/400 level courses in our sample was small this year, with only 13-14 artifacts aligning to *Inquiry-Based Thinking*, 6-8 to *Quantitative Thinking*, and none to *Creative Thinking*. However, we were pleased that 74% of students who submitted artifacts from 300/400 level courses received overall scores of 2.5 or higher in both *Inquiry-Based Thinking* and *Quantitative Thinking* and that 25% received scores of 3.5 or higher for *Inquiry-Based Thinking*. A score of 2.5 indicates that at least one rater assigned a score of Level 3 to the artifact, a score of 3 indicates that both raters assigned a score of Level 3.0, a score of 3.5 indicates that at least one rater assigned a score of Level 4, and a score of 4.0 indicates that both raters assigned a score of Level 4.

When examining mean performance across all artifacts, we noted that, for *Creative Thinking,* ambiguities/possibilities/problem emerged as a relative weakness (*mean* = 1.49; *n* = 50) among the traits of this outcome. Only 14% of the 50 artifacts received scores between 2.5 and 4.0 (as compared to 34% for risk taking, 36% for innovative thinking, and 28% for synthesizes/connects/transforms).

For *Inquiry-Based Thinking*, we noted little variation among means scores for either 100/200 level or 300/400 level courses. For 100/200 level courses, means ranged from 1.89 for research of existing knowledge/evidence to 2.05 for conclusions and related outcomes and for 300/400 level courses from 2.54 for research of existing knowledge/evidence to 2.69 for conclusions and related outcomes. Likewise, for *Quantitative Thinking* mean scores for 100/200 level courses ranged from 2.00 for context to 2.29 for interpretation and from 2.3 for context to 2.67 for representation. The only trait of *Quantitative Thinking* that showed significantly higher performance at the 300/400 than at the 100/200 level was representation, whereas students from our sample enrolled in 300/400 level courses performed significantly better than did students enrolled in 100/200 level courses on all traits of *Inquiry-Based Thinking*.

Overall, *Creative Thinking* emerged as a relative weakness among the three outcomes assessed this cycle. For 100/200 level courses, 72% of students scored between levels 1.5 and 4, with only 30% scoring at least at 2.5. This compares to 86% for Inquiry-Based Thinking and 90% for Quantitative Thinking.

Recommendations from the 2021 Assessment Team

The Summer Assessment Team made the following recommendations:

1. That we work with the Center for Teaching and Learning to form an interdisciplinary committee to review, and consider modifications to, our existing Baccalaureate Degree Profile (BDP) outcome, *Creative Thinking*. This outcome had the lowest performance in our assessment this year and these results mirrored those found for student performance on *Creative Thinking* in summers 2018 and 2017. The Summer Assessment Team has noted that, although we think it is important to have a rubric that works for all disciplines, our earlier efforts to do this may have resulted in a rubric that does not include appropriate evaluation criteria for creative productions, such as those developed by students in the creative arts (e.g., visual art and music). One member of the team suggested that we modify the outcome to include *creative production* and *creative problem-solving*.
2. That the Office of Assessment and Quality Initiatives complete an analysis of the alignment between undergraduate degree program outcomes and those of the BDP. Since programs have made these alignments by BDP trait, this analysis will help us to identify to which outcomes/traits our degree programs align most often.
3. That, following completion of point 2, we start the process of determining if modifications should be considered for outcomes of the BDP not mentioned in point 1.
4. That we work with the General Education Council regarding strategies to ensure that faculty teaching Core I courses align the assignment (their Core I application indicated would be aligned) to the appropriate BDP outcome in Blackboard. This might include a communication

strategy, e.g., presenting results of past assessments to the Faculty Senate and talking about why this process is important. It might include emphasizing the people available to help faculty make these alignments in Blackboard, e.g., the MU Online Design Center.

5. That the Office of Assessment and Quality Initiatives continue to provide and distribute shorter reports in more digestible formats. We recommend that these reports be disseminated campus-wide through the Assessment Newsletter and shared with the Faculty Senate.
6. That we work with the Center for Teaching and Learning and the General Education Council to consider wider involvement by faculty teaching core curriculum courses in the assessment of artifacts uploaded to Blackboard. This might take the form of a pilot year of using existing rubrics to assess samples of the student artifacts required for alignment to the Baccalaureate Degree Profile outcome they have chosen in Blackboard. Our hope is that, by using the university level rubrics to evaluate a sample of the artifacts they have asked students to complete, they will either suggest modifications to the rubric or they will ensure that their assignments align with the rubric being used.

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Supporting Documentation

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Baccalaureate Degree Profile Artifact Assessment

Academic Year 2020 – 2021

Outcomes Assessed: MU Rubrics

Outcome	Abbreviation	Traits	Abbreviations
Creative Thinking	**Creative**	Ambiguities/Possibilities/ Problem	Possibilities
		Risk Taking	Risk
		Innovative Thinking	Innovation
		Synthesizes/Connects/ Transforms	Synthesis
Inquiry-Based Thinking	**IBT**	Problem/Question/Issue	Issue
		Research of Existing Knowledge/Evidence	Evidence
		Data Collection and Analysis/Student's Position	Position
		Conclusions and Related Outcomes	Conclusions
Quantitative Thinking	**QT**	Context	Context
		Interpretation	Interpretation
		Representation	Representation
		Calculation	Calculation
		Application/Analysis	Analysis

Course Types

Course Type	Abbreviation
Critical Thinking	CT
Core II	Core II
Writing Intensive	WI
Senior Capstone	Capstone
First Year Seminar in Critical Thinking	FYS
Honors	Honors
Multicultural	MC
International	INT

Course Types in CREATE, IBT, and QT Outcome Sample

Each Course Counted Separately for Each Category
(i.e., sample *n* does not add to 384)

Course Type	Course Level	Sample *n*	Total Sample *n*
CT	100-200	120 (Creative); 90 (IBT); 116 (QT)	326
	300-400	N/A	
Core II	100-200	111 (Creative); 76 (IBT); 74 (QT)	261
	300-400	N/A	
WI	100-200	51 (Creative); 41 (IBT); 0 (QT)	107
	300-400	0 (Creative); 9 (IBT); 6 (QT)	
Senior Capstone	100-200	N/A	4
	300-400	0 (Creative); 4 (IBT); 0 (QT)	
FYS	100-200	8 (Creative); 22 (IBT); 0 (QT)	30
	300-400	N/A	
Honors	100-200	17 (Creative); 15 (IBT); 0 (QT)	32
	300-400	0 (Creative); 0 (IBT); 0 (QT)	
MC	100-200	34 (Creative); 58 (IBT); 0 (QT)	92
	300-400	0 (Creative); 0 (IBT); 0 (QT)	
INT	100-200	9 (Creative); 0 (IBT); 0 (QT)	9
	300-400	0 (Creative); 0 (IBT); 0 (CT)	
Total	100-200	842	861
	300-400	19	

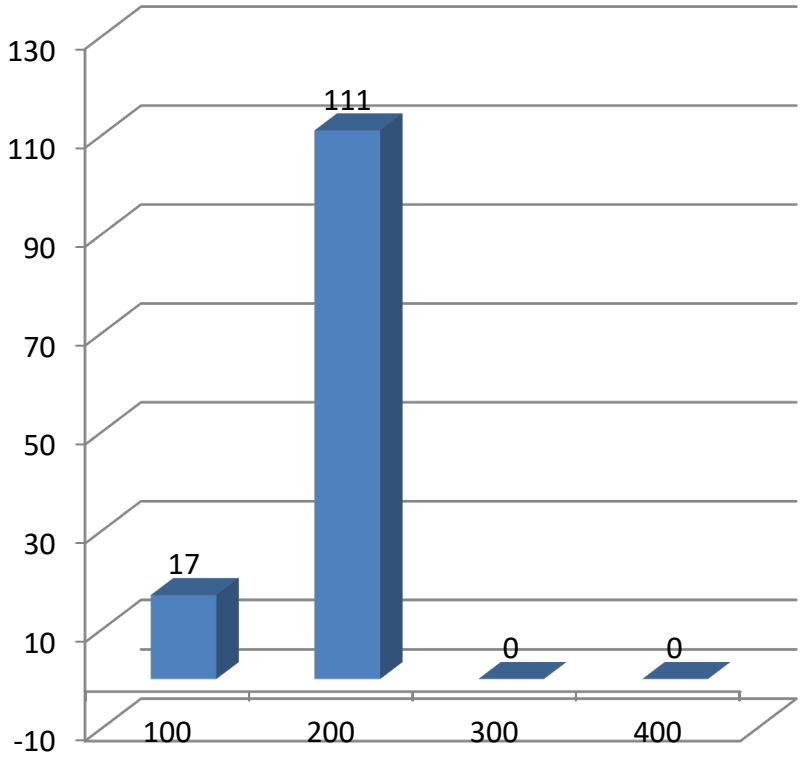
Population/Sample Comparisons for Marshall's Learning Outcomes by Course Level

Marshall Outcomes	Course Level = 100/200			Course Level = 300/400		
	Population	**Sample**	**Percent**	**Population**	**Sample**	**Percent**
Creative Thinking	277	128	46%	0	0	0
Inquiry-Based Thinking	1,123	114	10%	64	14	22%
Quantitative Thinking	371	116	31%	29	12	41%
Total	**1,771**	**358**	**20%**	**93**	**26**	**28%**

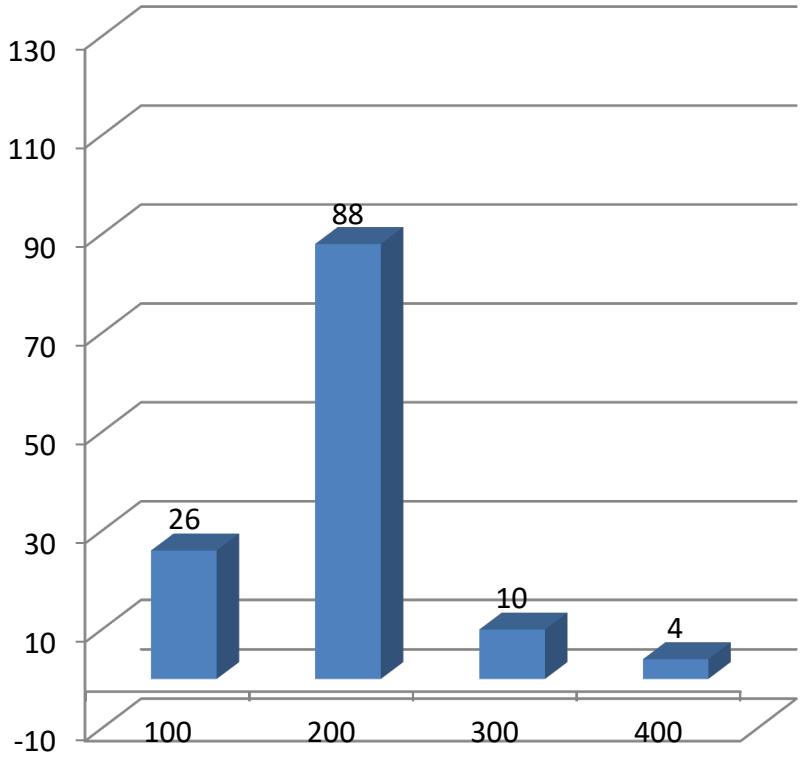
Sample Frequencies

Total # of artifacts assessed = 128 per outcome

Course Level Frequencies: Creative Thinking



Course Level Frequencies: Inquiry-Based Thinking

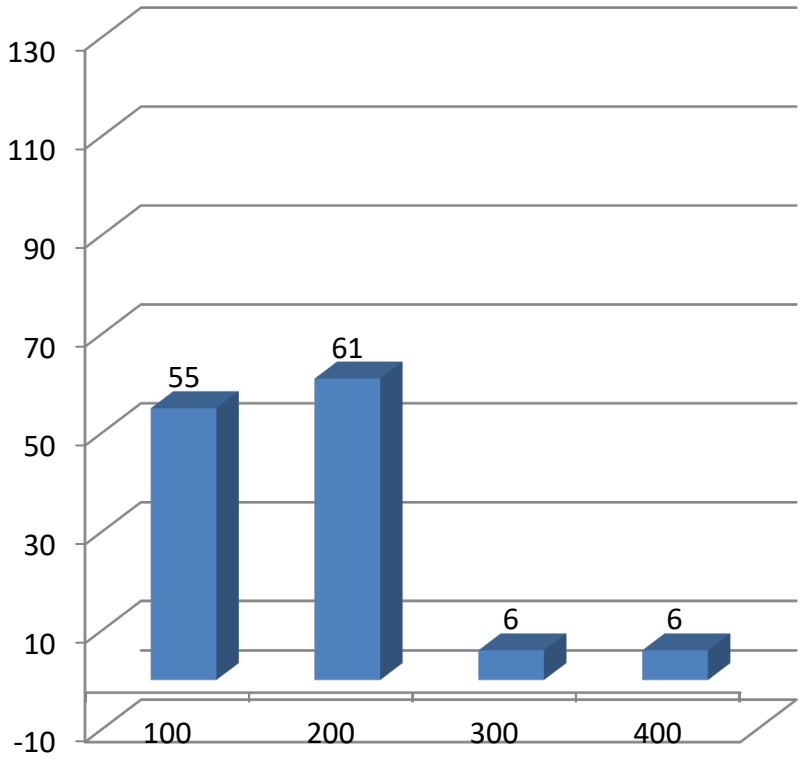


Sample Frequencies

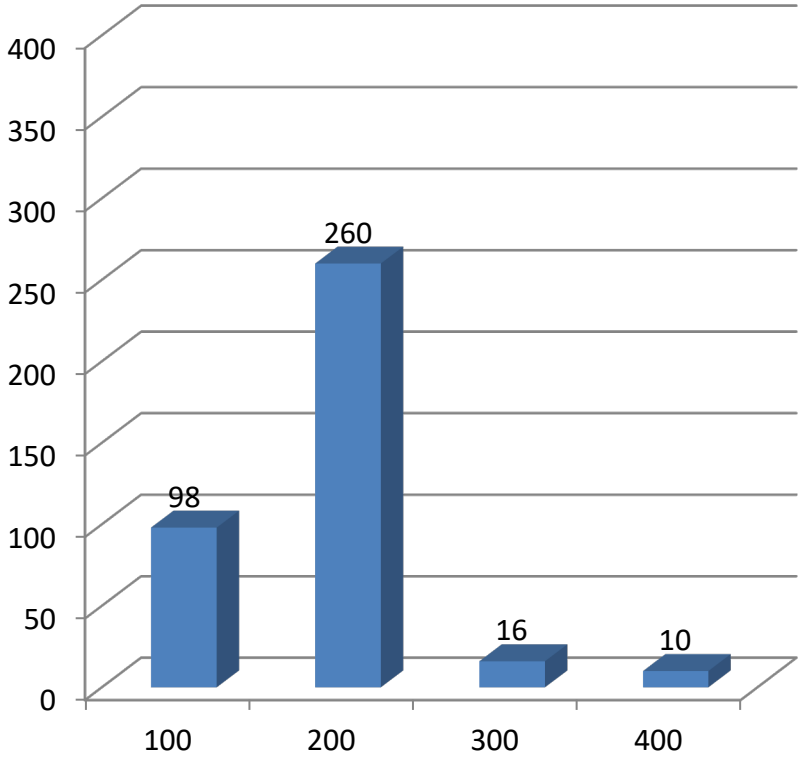
Total # of artifacts assessed = 128 per outcome

Total = 384

Course Level Frequencies: Quantitative Thinking



Course Level Frequencies: Total across the three outcomes



Review Procedures

- Each artifact had two independent raters and usable scores on the 1 – 4 scale were determined in the following manner:
  - If raters assigned the same score, that became the score for the artifact.
  - If raters' scores differed by one point, e.g., Rater 1 assigned a score of 1 and Rater 2 a score of 2, the final score was the mean, i.e., 1.5.
  - If raters' scores differed by more than one point, e.g., Rater 1 assigned a score of 1 and Rater 2 a score of 3, the raters met to discuss the rationale for their scores to see if they could agree on a score or, at minimum, scores that differed by no more than one point.
  - If raters' scores differed by more than one point and, after discussion, they were not able to resolve the differences, a third rater was assigned to review the artifact.

Review Procedures

- We also allowed reviewers to assign a score of 0 when they did not see evidence of the trait in the artifact. When one rater assigned a score of 0 and the second rater assigned a score of 1 – 4, they also met to discuss the rationale for their scores to see if they could agree on the presence (or not) of the trait in the assignment or artifact. If they could not agree, a third reader was assigned.
- We determined, as a group, which assignments did not align to specific traits of each outcome. Reviewers were instructed to score non-aligned traits as not applicable (N/A).

Third Readers for this Year's Review

- We had nine artifacts (total of 16 traits) that required a third review. For seven of the artifacts (total of 14 traits), reviewers could not agree between a score of N/A or "0" (in some cases reviewers assigned scores of N/A even though we had not agreed the assignments in question required a score of "N/A") and a numerical score between 1 and 4. For 8 of the 14 traits a third reader scored the trait with either a numerical scores between 1 and 4 or a score of 0, which allowed a final score to be determined. For the other four traits, a fourth reader was required to arrive at a final score.
- The original reviewers for the final two artifacts (one trait each) settled on numerical scores that were 2 points apart. The third reviewer was able to resolve both disagreements. In one case, the third reviewer assigned a score between the two scores originally assigned, which became the score for that artifact. In the second case, the third reviewer's score agreed with one of the original reviewers, so that score became the final score for the artifact.

Interrater Reliability

- We conducted interrater reliability analyses using the Cohen's Kappa statistical procedure. In so doing, we used the following rules, similar to those suggested Stellmack, Kohneim-Kalkstein, Manor, Massey, & Schmitz (2009):
  - Since our scoring procedure was to average final scores between two raters when scores differed by only one point, we used that averaged score (e.g., 1.5) as the score for both raters, counting it as an agreement in the interrater reliability analysis.
  - When each evaluator rated an artifact trait as 0 (i.e., no evidence of the rubric trait in the artifact), these ratings were counted as agreements in the interrater reliability analysis.
  - For scores that were two or more points apart, the original score of each reviewer was used in the analysis. Therefore, these scores were counted as disagreements.
  - Any time one rater scored the artifact as 0 or N/A and another provided a score, the scores were counted as disagreements in the analysis.

Artifacts Excluded from Analysis of Means Due to Inability to Assess or Misalignment with Tagged Outcomes

Outcome	Total Artifacts	Total Artifacts Not Able to be Scored	Total Used for Analysis	Notes:
Creative Thinking	128	1	127	Mix of N/A and 0 = 1
Inquiry-Based Thinking	128	3	125	All scores of 0 = 1 Mix of N/A and 0 = 1 Was aligned incorrectly = 1
Quantitative Thinking	128	17	111	Could not be scored because reviewers could not access all information = 12 Mix of N/A and 0 = 3 All scores of 0 = 2
Total	**384**	**21**	**363**	

Revised Creative Thinking Rubric

Some wording adapted from AAC&U Creative Thinking Value Rubric

This rubric was created using the Association of American Colleges and Universities (AAC&U) Crreative Thinking VALUE Rubric. Retrieved from https://www.aacu.org/value-rubrics

Creative Thinking: Students will **outline** multiple divergent solutions to a problem, **explore** and **develop** risky or controversial ideas, and **synthesize** ideas/expertise to **generate** innovations.

Traits: Performance Indicators/Performance Levels	N/A	Level 0	Level 1	Level 2	Level 3	Level 4
Ambiguities & Possibilities: Outlines (or considers) multiple divergent solutions to a problem.	Trait does not apply to this artifact.	Does not **outline (consider)** solutions to a given problem.	**Outlines** (or **considers**) a single solution to a problem, either feasible or infeasible.	**Outlines** (or considers) more than one solution and **rejects** less acceptable approaches to solving the problem.	Having **selected** from among alternatives, **develops** a logical, consistent plan to solve the problem.	Not only **develops** a logical, consistent plan to solve the problem, but **recognizes consequences** of the solution and **articulates reason** for choosing the solution.
Risk Taking: Explores and **develops** risky or controversial ideas.	Trait does not apply to this artifact.	Does not **explore or develop** risky or controversial ideas.	**Explores,** but does not **develop** risky or controversial ideas. **OR** Stays strictly within the guidelines of the assignment.	**Explores** risky or controversial ideas and **develops** these ideas, but only in a superficial manner. **OR** **Considers new directions** or approaches without going beyond the guidelines of the assignment.	**Explores** risky or controversial ideas and **develops** these ideas in some depth. **OR** **Incorporates new directions** or approaches to the assignment in the final product.	**Explores** risky or controversial ideas, and thoroughly **develops** these ideas. **OR** Actively **seeks out** and **follows through** on untested and potentially risky directions or approaches to the assignment in the final product.
Innovative Thinking: Generates innovations (novel/unique).	Trait does not apply to this artifact.	Does not generate innovations.	**Reformulates** a collection of available ideas.	**Experiments** with creating a novel or unique idea, question, format, or product.	**Creates** a novel or unique idea, question, format, or product.	**Extends** a novel or unique idea, question, format, or product to create new knowledge or knowledge that crosses boundaries.
Connecting, Synthesizing, Transforming: Synthesizes ideas or solutions.	Trait does not apply to this artifact.	Does not recognize connections.	**Recognizes** existing connections among ideas or solutions.	**Connects** ideas or solutions in novel ways.	**Synthesizes** ideas or solutions into a coherent whole.	**Transforms** ideas or solutions into entirely new forms.

Revised Inquiry-Based Thinking Rubric (Page 1)

Some wording adapted from AAC&U Critical Thinking Value Rubric

This rubric was created using the Association of American Colleges and Universities (AAC&U) Critical Thinking VALUE Rubric. Retrieved from https://www.aacu.org/value-rubrics

Inquiry-Based Thinking: Students will **formulate** focused questions and/or hypotheses, **evaluate** existing knowledge, **collect** and **analyze** data, and **draw** justifiable conclusions.

Traits: Performance Indicators/Performance Levels	**N/A**	**Level 0**	**Level 1**	**Level 2**	**Level 3**	**Level 4**
Problem/Question/ Issue: Formulates focused questions and/or hypotheses.	Trait does not apply to this artifact.	No problem, question, or issue is stated.	**Formulates** a question and/or hypothesis, but not one that is necessarily focused or manageable. **OR** **Issue/problem** to be considered critically is stated without clarification or description.	**Formulates** a question and/or hypothesis that is focused and manageable. **OR** **Issue/problem** to be considered critically is stated, but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or backgrounds unknown.	**Formulates** a question and/or hypothesis that is focused and manageable and addresses a potentially significant area of inquiry. **OR** **Issue/problem** to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	**Formulates** a focused, and manageable question and/or hypothesis that addresses significant yet less-explored aspects of the topic. **OR** **Issue/problem** to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.
Research of Existing Knowledge/Evidence: Evaluates existing knowledge **OR** **Selects** and **uses** information to investigate a point of view or conclusion.	Not applicable to this artifact.	Does not **evaluate** existing knowledge.	**Evaluates** some existing research relevant to the problem/question, but only includes those that support one side of an issue or includes information from some questionable sources. **OR** Information is taken from sources without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.	**Evaluates** some existing research relevant to the problem/question from reputable sources. The review is balanced but not comprehensive. **OR** Information is taken from sources with some interpretation/ evaluation, but not enough to develop a coherent analysis of synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	**Uses** reputable sources to **conduct** a comprehensive evaluation of existing research relevant to the problem/question. **OR** Information is taken from sources with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	**Evaluates and synthesizes** in-depth relevant information from reputable sources representing various points of view/approaches. **OR** Information is taken from sources with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.
Data Collection and Analysis/Student's Position: Collects and **analyzes** data. **OR** Student's position (perspective, thesis/hypothesis)	Not applicable to this artifact.	Neither **collects** nor **analyzes** the data. **OR** Does not state a position.	**Collects** but does not **analyze** the data. **OR** Specific position (perspective, thesis/hypothesis) is stated, but is simplistic and obvious.	**Collects** but incompletely **analyzes** the data. **OR** Specific position (perspective, thesis/hypothesis) acknowledges different sides of an issue.	Thoroughly **analyzes** the data. **OR** Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/hypothesis).	Thoroughly **analyzes** and **synthesizes** the data. **OR** 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).

Revised Inquiry-Based Thinking Rubric (Page 2)

Some wording adapted from AAC&U Critical Thinking Value Rubric

This rubric was created using the Association of American Colleges and Universities (AAC&U) Critical Thinking VALUE Rubric. Retrieved from https://www.aacu.org/value-rubrics

Traits: Performance Indicators/Performance Levels	N/A	Level 0	Level 1	Level 2	Level 3	Level 4
Conclusions and related outcomes (implications and consequences): Draws justifiable conclusions.	Not applicable to this artifact.	Does not **draw** conclusions.	Conclusions neither **address** the question and/or hypothesis nor are supported by the data. **OR** Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.	Conclusions either **address** the question and/or hypothesis or are supported by the data. **OR** Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusions both **address** the question and/or hypothesis and are supported by the data. **OR** Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	**Fulfills level 3 plus suggests** how results might apply to other problems or inform future studies. **OR** 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.

Revised Quantitative Thinking Rubric

The last four traits are taken from the AAC&U Quantitative Literacy Value Rubric

This rubric was created using the Association of American Colleges and Universities (AAC&U) Quantitative Literacy VALUE Rubric. Retrieved from https://www.aacu.org/value-rubrics

Quantitative Thinking: Students will analyze real-world problems quantitatively, explain information presented in mathematical forms, convert mathematical information into mathematical forms, perform calculations, and make judgments and draw appropriate conclusions based on the quantitative analysis of data, while recognizing the limits of this analysis.

Traits: Performance Indicators/ Performance Levels	**N/A**	**Level 0**	**Level 1**	**Level 2**	**Level 3**	**Level 4**
Context: Analyzes real-world problems quantitatively.	Trait does not apply to this artifact.	Does not **explain, report,** or **analyze** real-world problems quantitatively.	**Explains** and **reports** the problem within its context quantitatively. **Identifies** basic metrics to solve the problem.	**Level 1 plus uses** appropriate tools to analyze metrics to **solve** problems in a given context.	**Level 2 plus articulates** meanings of a quantitative analysis.	**Develops** metrics, **uses** appropriate tools, and **applies** solutions to **solve** novel problems.
Interpretation: Ability to explain information presented in mathematical forms (e.g., equations, graphs, diagrams, tables, words).	Trait does not apply to this artifact.	Makes no attempt to explain information presented in mathematical forms.	Attempts to explain information presented in mathematical forms but draws incorrect conclusions about what the information means. *For example, attempts to explain the trend data shown in a graph, but will frequently misinterpret the nature of the trend, perhaps by confusing positive and negative trends.*	Provides somewhat accurate explanations of information presented in mathematical forms, but occasionally makes minor errors related to computations or units. *For instance, accurately explains trend data shown in a graph, but may miscalculate the slope of the trend line.*	Provides accurate explanations of information presented in mathematical forms. *For instance, accurately explains the trend data shown in a graph.*	Provides accurate explanations of information presented in mathematical forms. Makes appropriate inferences based on that information. *For instance, accurately explains the trend data shown in a graph and makes reasonable predictions regarding what the data suggest about future events.*
Representation: Ability to convert relevant information into various mathematical forms (e.g., equations, graphs, diagrams, tables, words).	Trait does not apply to this artifact.	Does not convert relevant information into mathematical forms.	Completes conversion of information, but resulting mathematical portrayal is inappropriate.	Completes conversion of information, but resulting mathematical portrayal is only partially appropriate or accurate.	Competently converts relevant information into an appropriate and desired mathematical portrayal.	Skillfully converts relevant information into an insightful mathematical portrayal in a way that contributes to a further or deeper understanding.
Calculation	Trait does not apply to this artifact.	No calculations are attempted.	Calculations are attempted but are both unsuccessful and are not comprehensive.	Calculations attempted are either unsuccessful or represent only a portion of the calculations required to comprehensively solve the problem.	Calculations attempted are essentially all successful and sufficiently comprehensive to solve the problem.	Calculations attempted are essentially all successful and sufficiently comprehensive to solve the problem. Calculations are also presented elegantly (clearly, concisely, etc.)
Application/Analysis: Ability to make judgments and draw appropriate conclusions based on the quantitative analysis of data, while recognizing the limits of this analysis.	Trait does not apply to this artifact.	Does not use mathematical data to form judgments or to draw conclusions.	Uses the quantitative analysis of data as the basis for tentative, basic judgments, although is hesitant or uncertain about drawing conclusions from this work.	Uses the quantitative analysis of data as the basis for a workmanlike (without inspiration or nuance, ordinary) judgments, drawing plausible conclusions from this work.	Uses the quantitative analysis of data as the basis for competent judgments, drawing reasonable and appropriately qualified conclusions from this work.	Uses the quantitative analysis of data as the basis for deep and thoughtful judgments, drawing insightful, carefully qualified conclusions from this work.

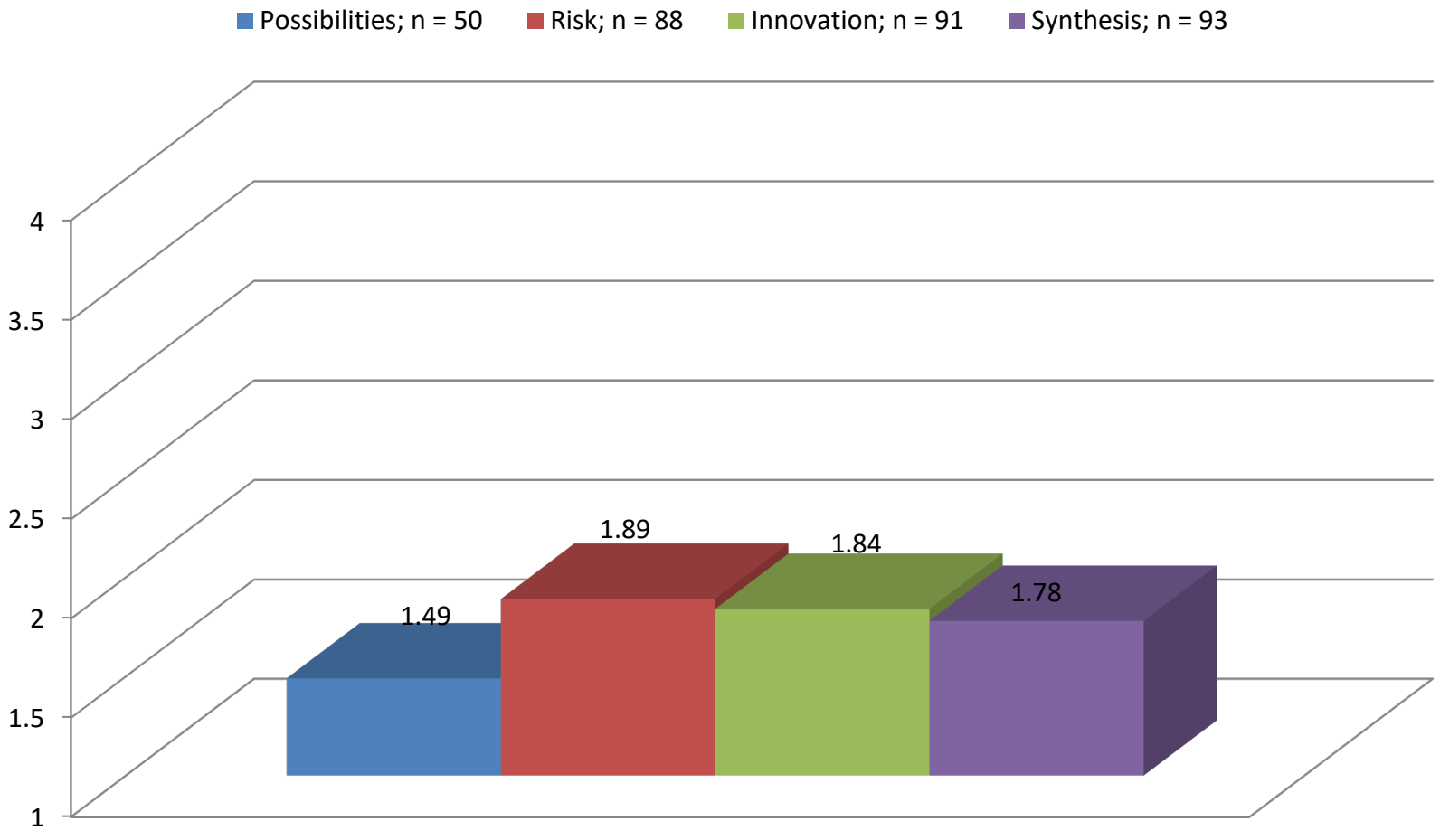
Creative Thinking

Mean Scores on a scale of 1 – 4, with 4 being the highest possible score

(Although there were 127 artifacts in the analysis, not all artifacts aligned to every trait and, in some cases, there was no evidence the student addressed a particular trait)

Note: All artifacts in this sample were from courses at the 100/200 level

Overall Analysis



Creative Thinking

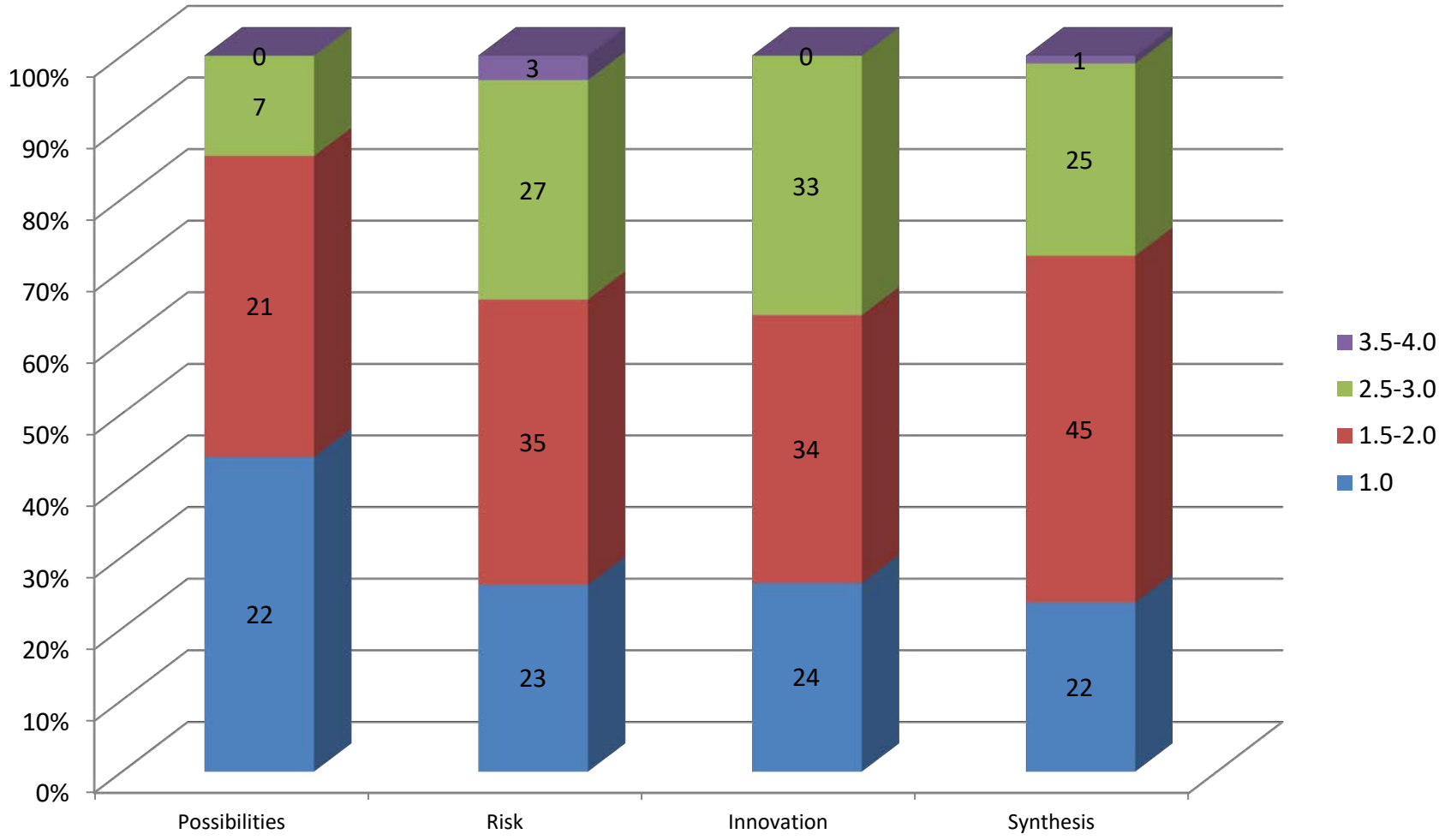
Frequency Analysis

Number of artifacts (with usable scores) scoring at each performance level

Trait/ Performance Level	Possibilities	Risk	Innovation	Synthesis	Total
1.0	22 (44%)	23 (26%)	24 (26%)	22 (24%)	91 (28%)
1.5 – 2.0	21 (42%)	35 (40%)	34 (37%)	45 (48%)	135 (42%)
2.5 – 3.0	7 (14%)	27 (31%)	33 (36%)	25 (27%)	92 (29%)
3.5 – 4.0	0	3 (3%)	0	1 (1%)	4 (1%)
Total Traits with Usable Scores	**50 (100%)**	**88 (100%)**	**91 (100%)**	**93 (100%)**	**322 (100%)**

Creative Thinking

Frequency Analysis



Creative Thinking

Inter-Rater Agreement Results

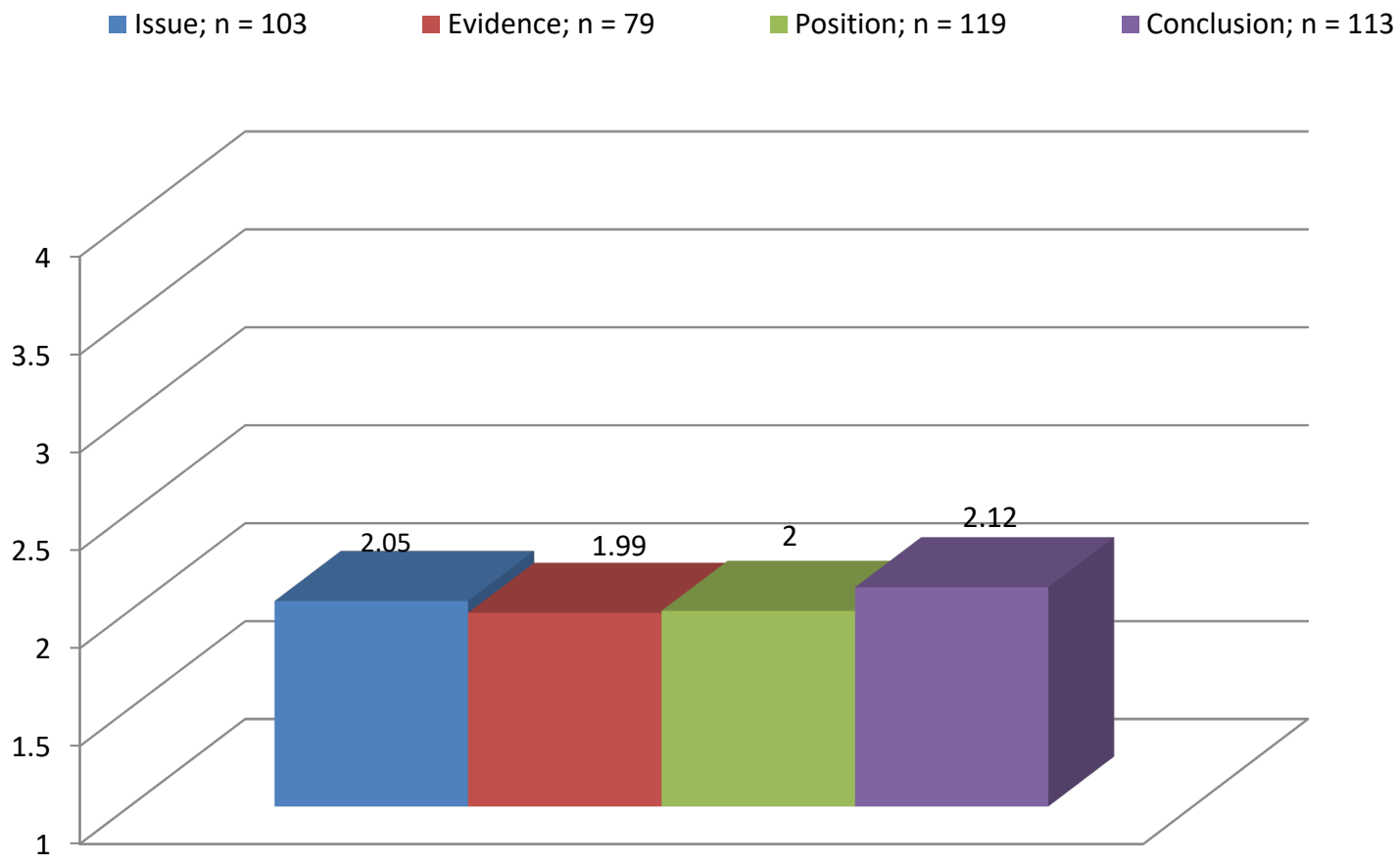
Trait/ Performance Level	Possibilities Kappa Liberal = .765	Risk Kappa Liberal = .785	Innovation Kappa Liberal = .811	Synthesis Kappa Liberal = .865
Agree on score or N/A	95 (74%)	70 (55%)	64 (50%)	69 (54%)
Difference = 1 point	15 (12%)	33 (26%)	41 (32%)	45 (35%)
Difference = 2 points	4 (3%)	8 (6%)	9 (7%)	6 (5%)
Difference = 3 points	1 (1%)	2 (2%)	0	0
Agree on Score of 0	0	2 (2%)	3 (2%)	0
Score + 0	13 (10%)	13 (10%)	11 (9%)	8 (6%)
Total	128	128	128	128

Inquiry-Based Thinking

Mean Scores on a scale of 1 – 4, with 4 being the highest possible score.

(Although there were 125 artifacts in the analysis, not all artifacts aligned to every trait and, in some cases, there was no evidence the student addressed a particular trait)

Overall Analysis



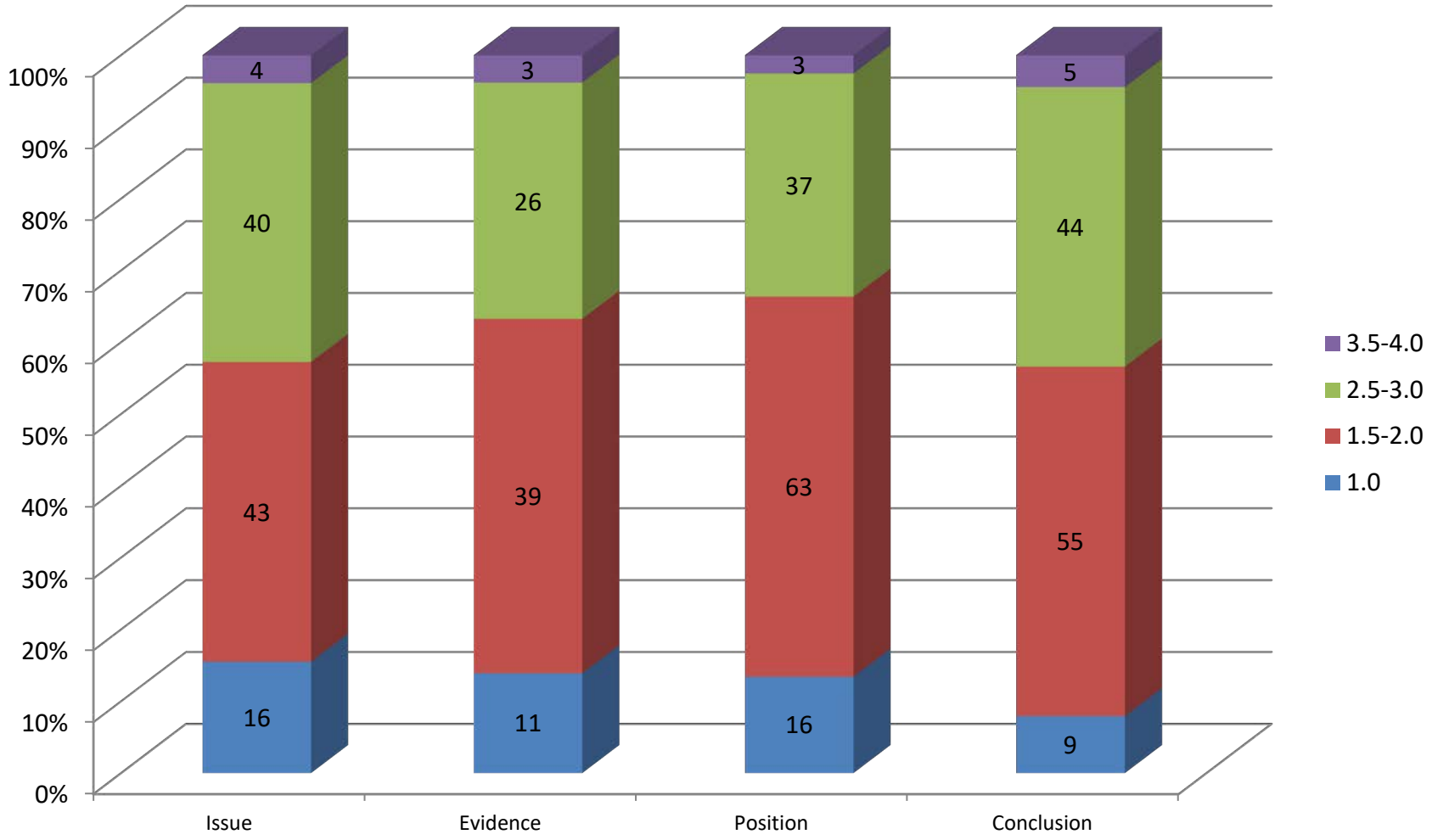
Inquiry-Based Thinking

Number of artifacts (with usable scores) scoring at each performance level

Trait/ Performance Level	Issue	Evidence	Position	Conclusion	Total
1.0	16 (16%)	11 (14%)	16 (13%)	9 (8%)	**52 (13%)**
1.5 – 2.0	43 (42%)	39 (49%)	63 (53%)	55 (49%)	**200 (48%)**
2.5 – 3.0	40 (39%)	26 (33%)	37 (31%)	44 (39%)	**147 (36%)**
3.5 – 4.0	4 (4%)	3 (4%)	3 (3%)	5 (4%)	**15 (4%)**
Totals	**103 (100%)**	**79 (100%)**	**119 (100%)**	**113 (100%)**	**414 (100%)**

Inquiry-Based Thinking

Frequency Analysis

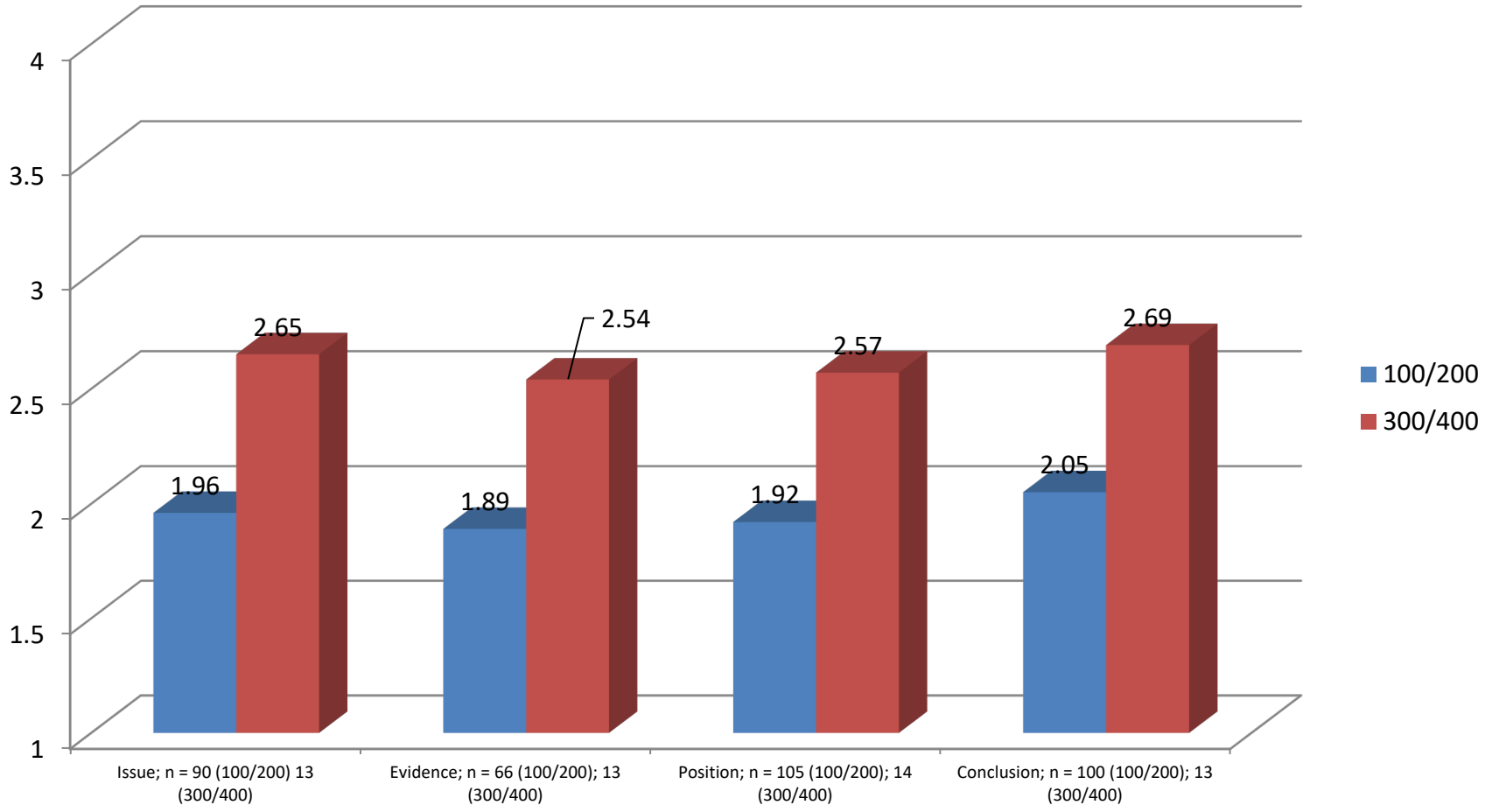


Inquiry-Based Thinking: Course Level Analysis

Mean Scores on a scale of 1 – 4, with 4 being the highest possible score

All course level differences were significant. Students enrolled in 300/400 level courses scored significantly higher than students enrolled in 100/200 level courses.

Course Level Analysis



Inquiry-Based Thinking

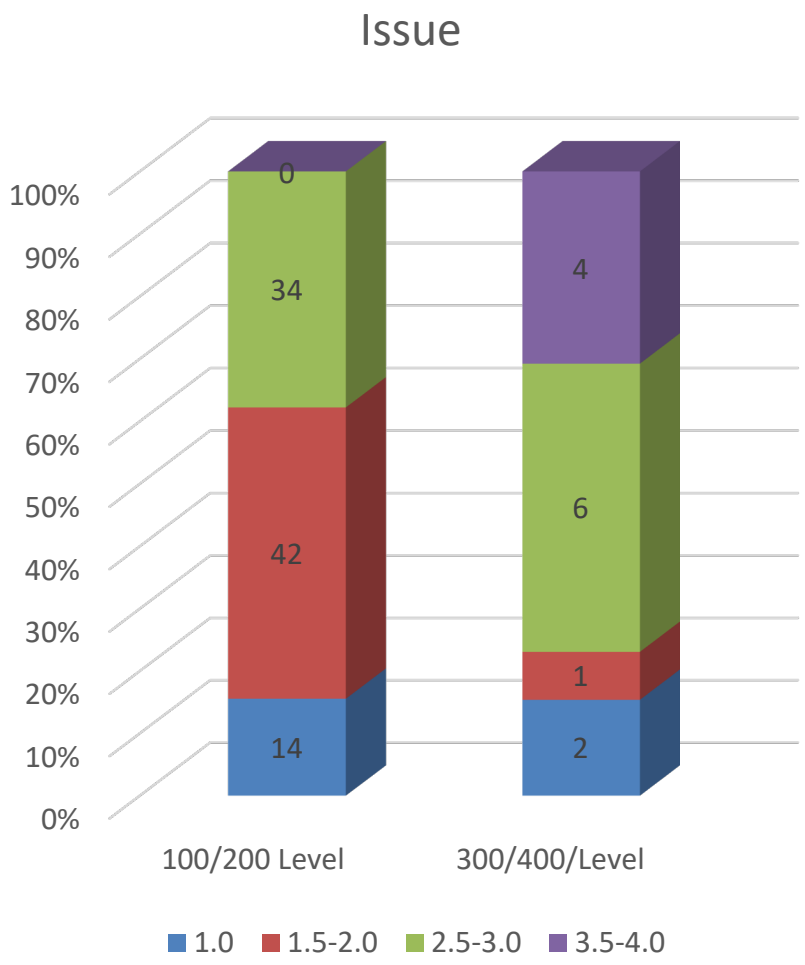
Frequency Analysis by Course Level

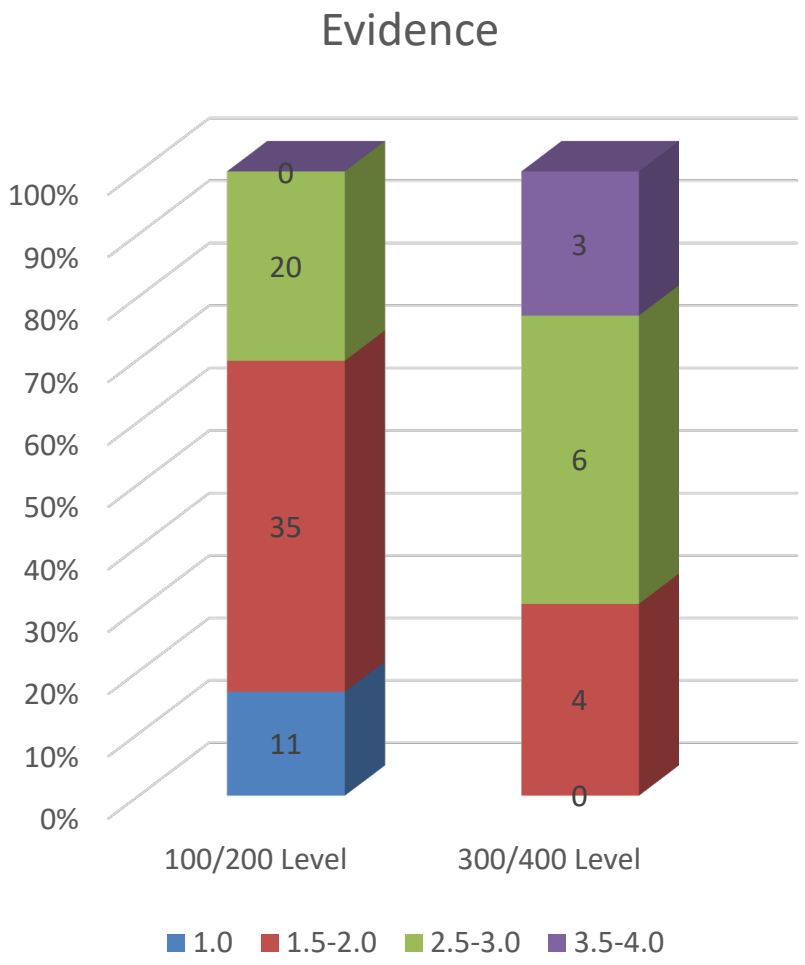
Number of artifacts (with usable scores) scoring at each performance level

Course Level	Trait/ Performance Level	Issue	Evidence	Position	Conclusion	Total
100/200	1.0	14 (16%)	11 (17%)	16 (15%)	9 (9%)	50 (14%)
300/400		2 (15%)	0	0	0	2 (4%)
100/200	1.5 – 2.0	42 (47%)	35 (53%)	59 (56%)	52 (52%)	188 (52%)
300/400		1 (8%)	4 (31%)	4 (29%)	3 (23%)	12 (23%)
100/200	2.5 – 3.0	34 (38%)	20 (30%)	30 (29%)	37 (37%)	121 (34%)
300/400		6 (46%)	6 (46%)	7 (50%)	7 (54%)	26 (49%)
100/200	3.5 – 4.0	0	0	0	2 (2%)	2 (1%)
300/400		4 (31%)	3 (23%)	3 (21%)	3 (23%)	13 (25%)
100/200	**Total Traits with Usable Scores**	**90 (100%)**	**66 (100%)**	**105 (100%)**	**100 (100%)**	**361 (100%)**
300/400		**13 (100%)**	**13 (100%)**	**14 (100%)**	**13 (100%)**	**53 (100%)**
All Course Levels	**Grand Totals**	**103**	**79**	**119**	**113**	**414**

Inquiry-Based Thinking

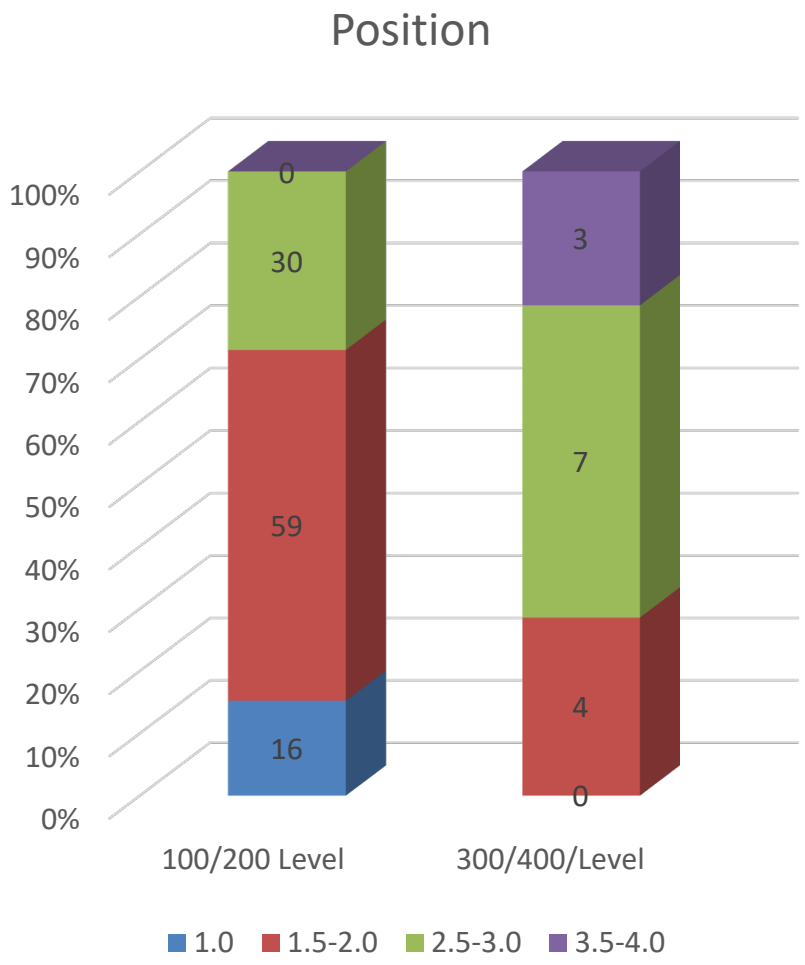
Frequency Analysis by Course Level

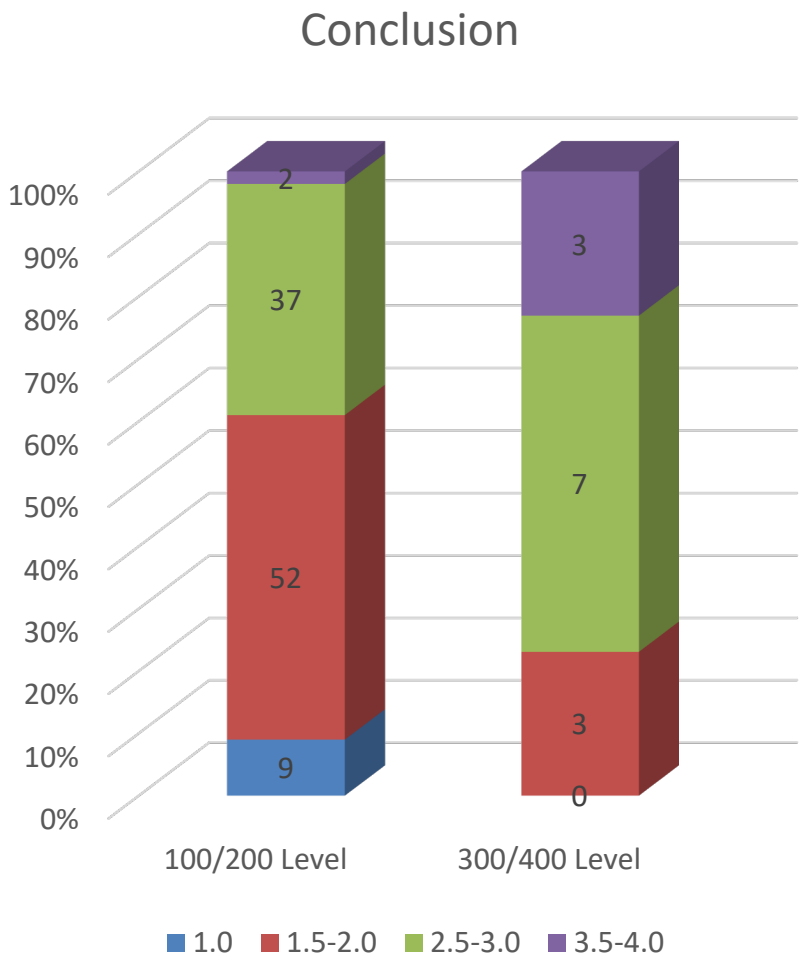




Inquiry-Based Thinking

Frequency Analysis by Course Level





Inquiry-Based Thinking

Inter-Rater Agreement Results

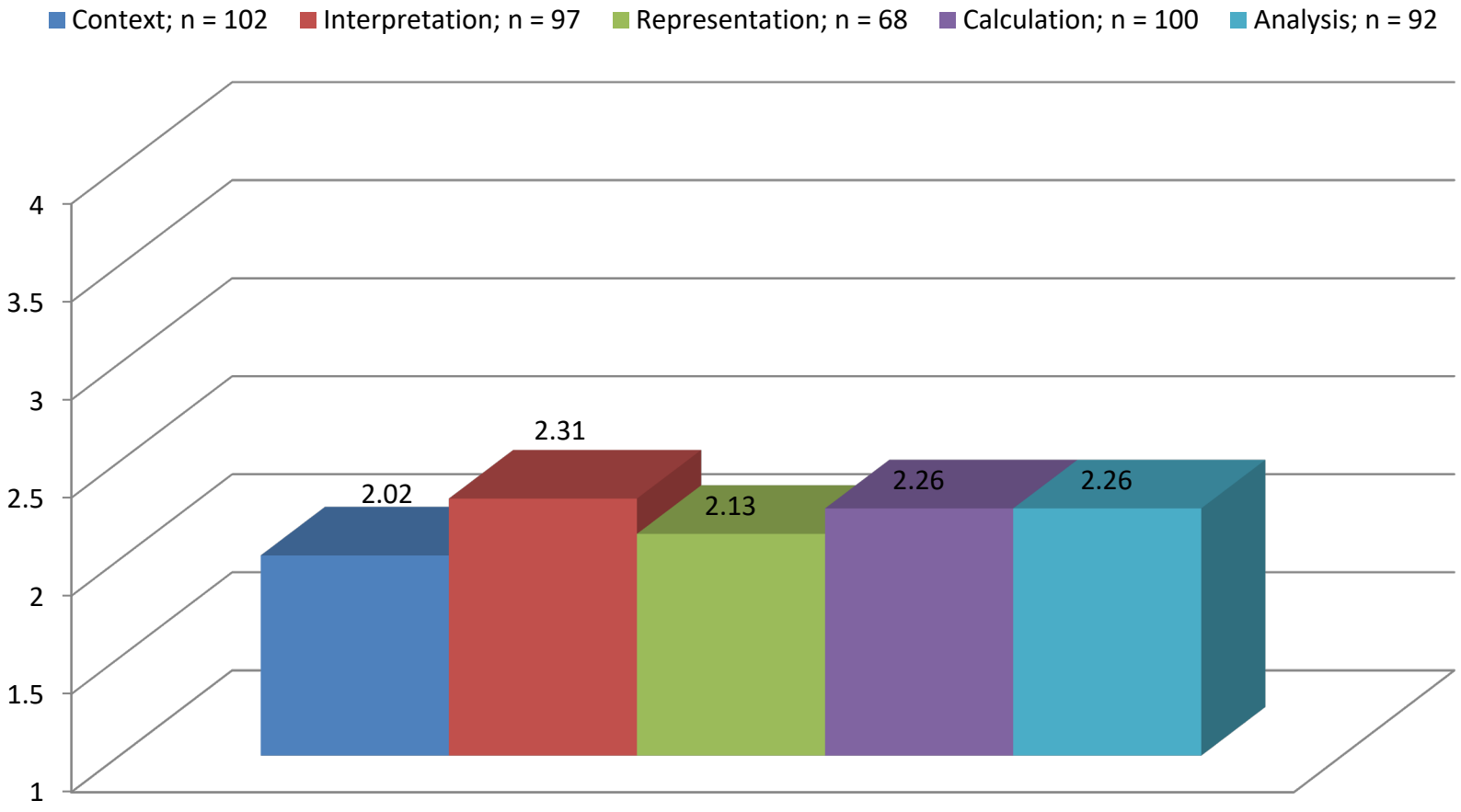
Trait/ Performance Level	Issue Kappa Liberal = .862	Evidence Kappa Liberal = .829	Position Kappa Liberal = .831	Conclusions Kappa Liberal = .831
Agree on score	52 (41%)	70 (55%)	63 (49%)	51 (40%)
Difference = 1 point	55 (43%)	35 (27%)	46 (36%)	53 (41%)
Difference = 2 points	6 (5%)	10 (8%)	10 (8%)	5 (4%)
Difference = 3 points	0	0	0	0
Agree on Score of 0	6 (5%)	6 (5%)	1 (1%)	6 (5%)
Score + 0	9 (7%)	7 (5%)	8 (6%)	13 (10%)
Total	128	128	128	128

Quantitative Thinking

Mean Scores on a scale of 1 – 4, with 4 being the highest possible score

(Although there were 112 artifacts in the analysis, not all artifacts aligned to every trait and, in some cases, there was no evidence the student addressed a particular trait)

Overall Analysis



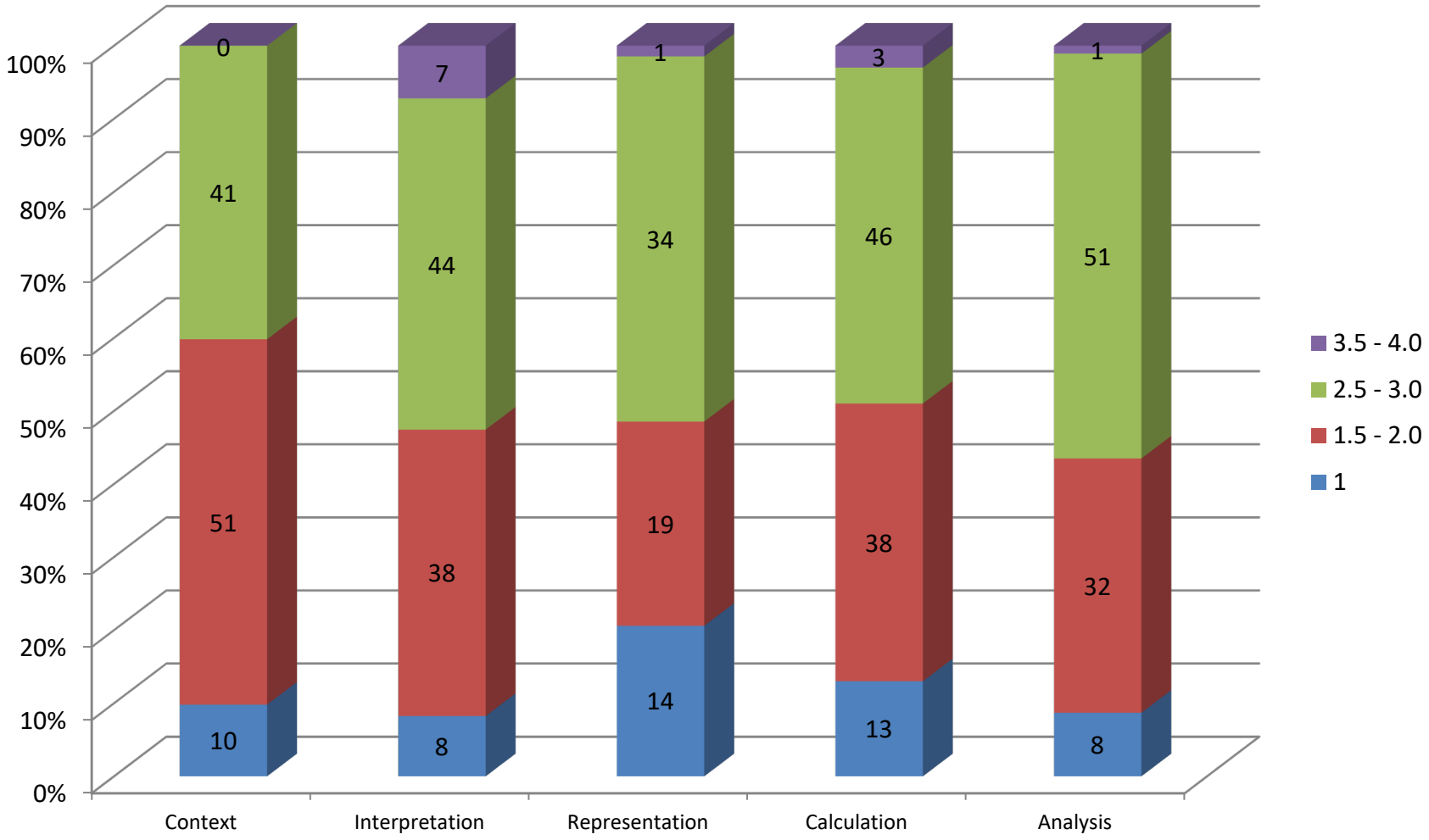
Quantitative Thinking

Number of artifacts (with usable scores) scoring at each performance level

Trait/ Performance Level	Context	Interpretation	Representation	Calculation	Analysis	Total
1.0	10 (10%)	8 (8%)	14 (21%)	13 (13%)	8 (9%)	**53 (12%)**
1.5 – 2.0	51 (50%)	38 (39%)	19 (28%)	38 (38%)	32 (35%)	**178 (39%)**
2.5 – 3.0	41 (40%)	44 (45%)	34 (50%)	46 (46%)	51 (55%)	**216 (47%)**
3.5 – 4.0	0	7 (7%)	1 (1%)	3 (3%)	1 (1%)	**12 (3%)**
Totals	**102 (100%)**	**128 (100%)**	**68 (100%)**	**100 (100%)**	**92 (100%)**	**459 (100%)**

Quantitative Thinking

Frequency Analysis

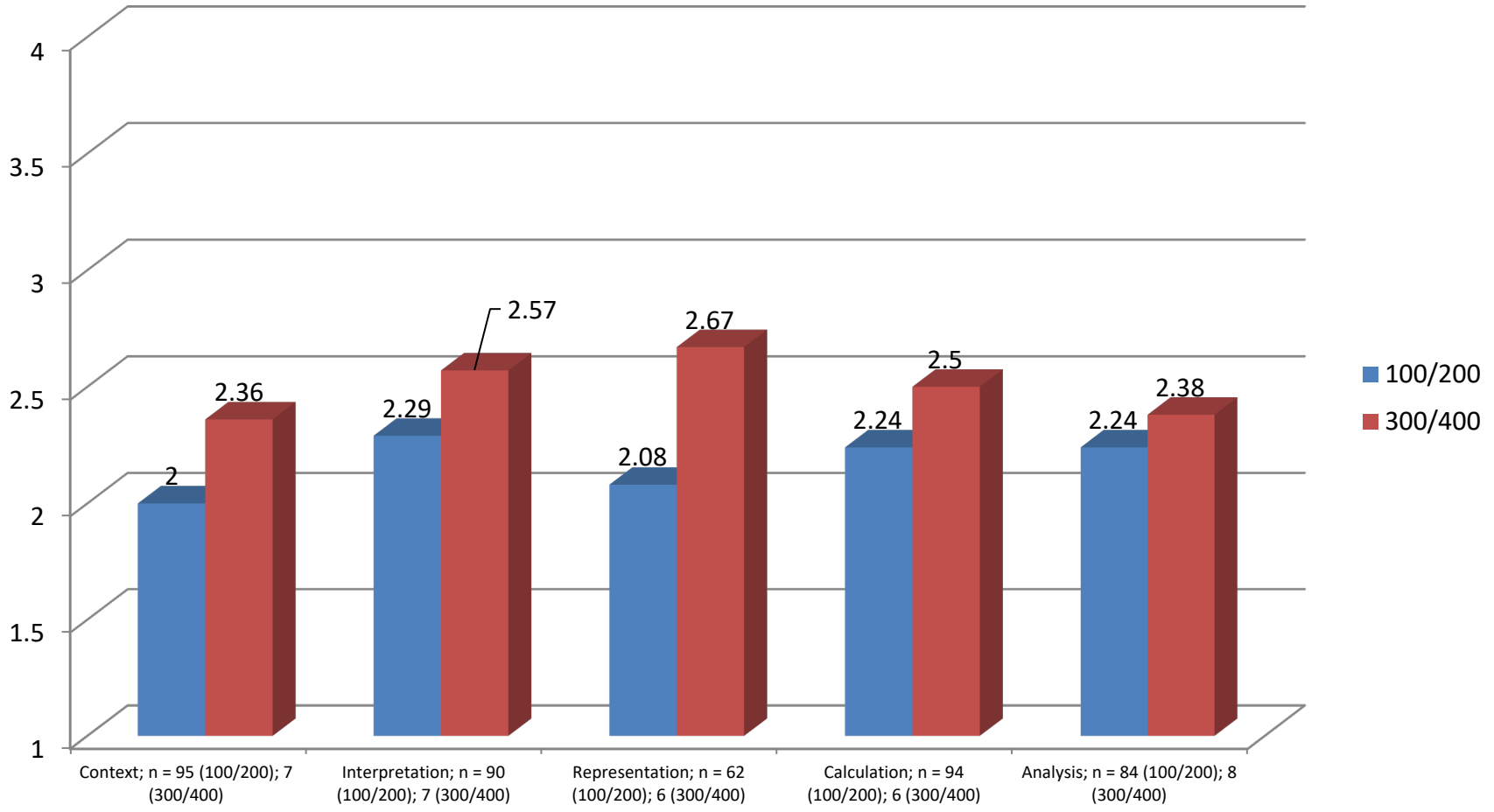


Quantitative Thinking

Mean Scores on a scale of 1 – 4, with 4 being the highest possible score

Respondents from 300/400 level courses scored significantly higher than those from 100/200 level courses on *representation.*

Course Level Analysis



Quantitative Thinking

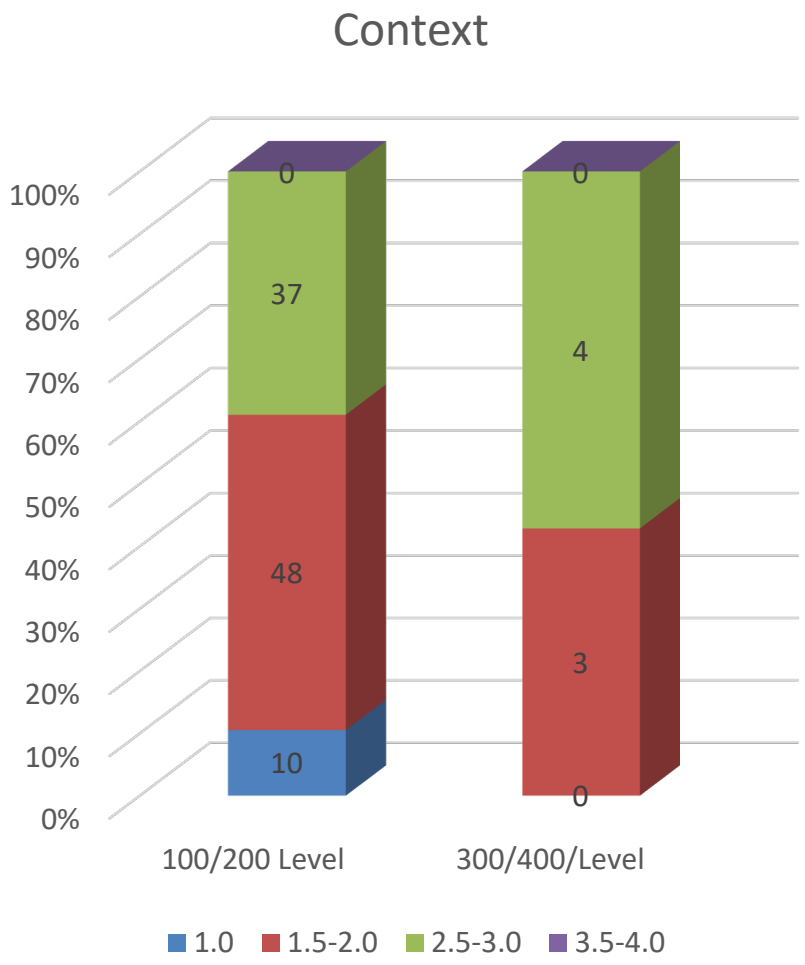
Frequency Analysis by Course Level

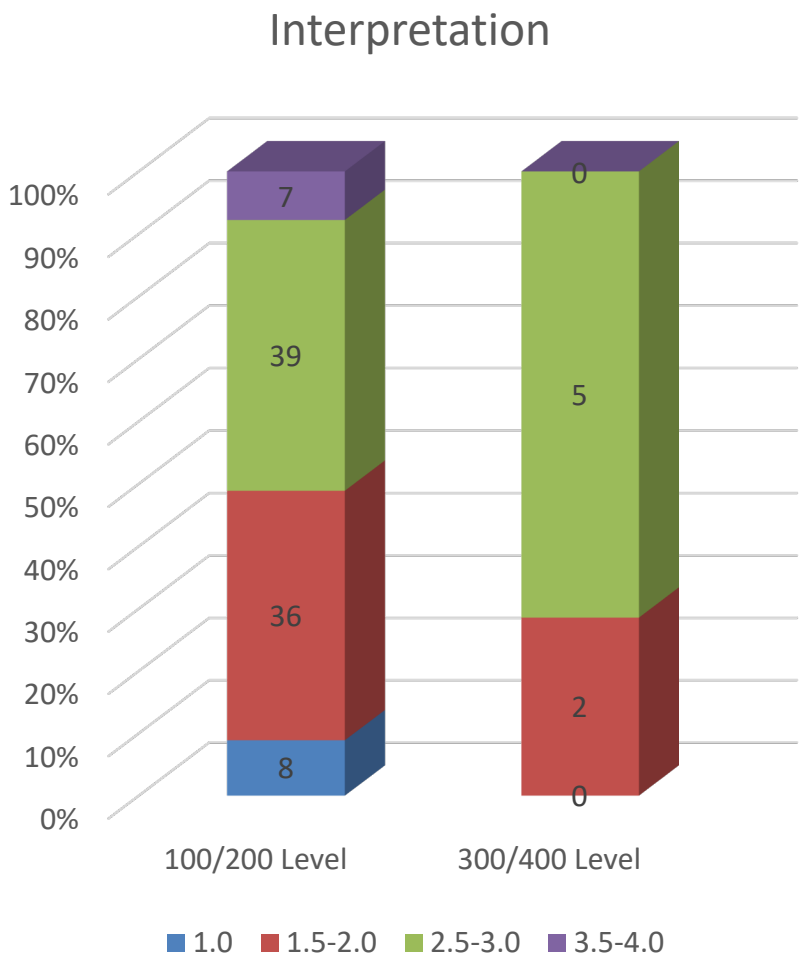
Number of artifacts (with usable scores) scoring at each performance level

Course Level	Trait/ Performance Level	Context	Interpretation	Representation	Calculation	Analysis	Total
100/200	1.0	10 (11%)	8 (9%)	14 (23%)	13 (14%)	8 (10%)	53 (12%)
300/400		0	0	0	0	0	0
100/200	1.5 – 2.0	48 (51%)	36 (40%)	19 (31%)	37 (39%)	29 (35%)	169 (40%)
300/400		3 (43%)	2 (29%)	0	1 (17%)	3 (38%)	9 (26%)
100/200	2.5 – 3.0	37 (39%)	39 (43%)	28 (45%)	41 (44%)	46 (55%)	191 (45%)
300/400		4 (57%)	5 (71%)	6 (100%)	5 (83%)	5 (63%)	25 (74%)
100/200	3.5 – 4.0	0	7 (8%)	1 (2%)	3 (3%)	1 (1%)	12 (3%)
300/400		0	0	0	0	0	0
100/200	**Total Traits with Usable Scores**	**95 (100%)**	**90 (100%)**	**62 (100%)**	**94 (100%)**	**84 (100%)**	**425 (100%)**
300/400		**7 (100%)**	**7 (100%)**	**6 (100%)**	**6 (100%)**	**8 (100%)**	**34 (100%)**
All Course Levels	**Grand Totals**	**102**	**97**	**68**	**100**	**92**	**459**

Quantitative Thinking

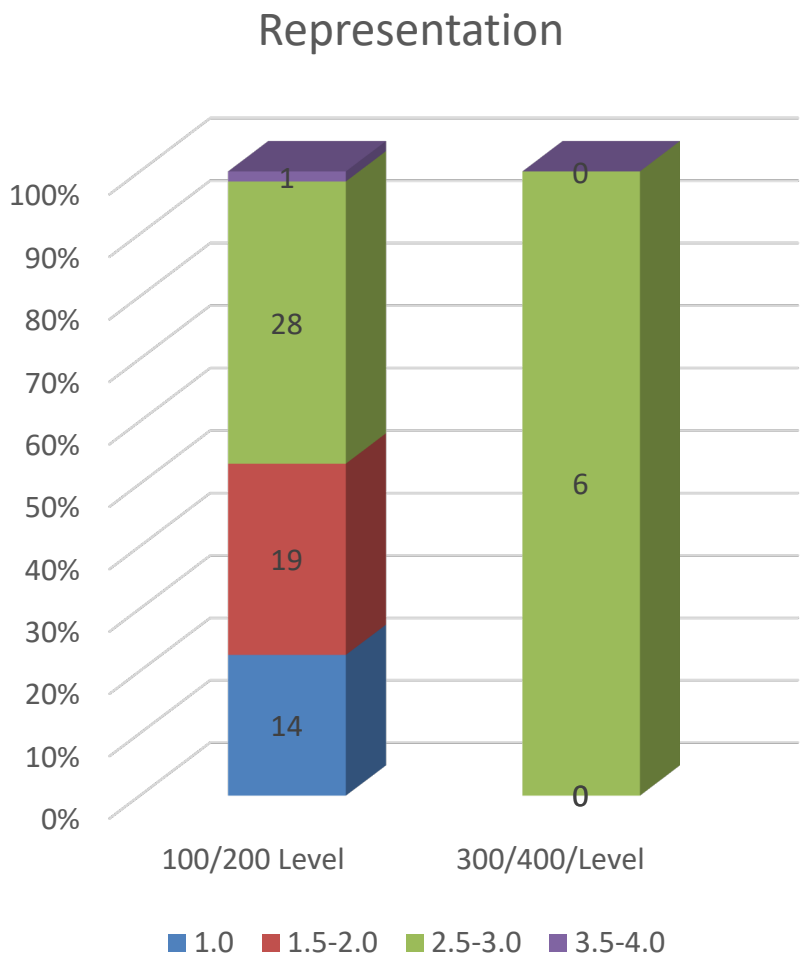
Frequency Analysis by Course Level

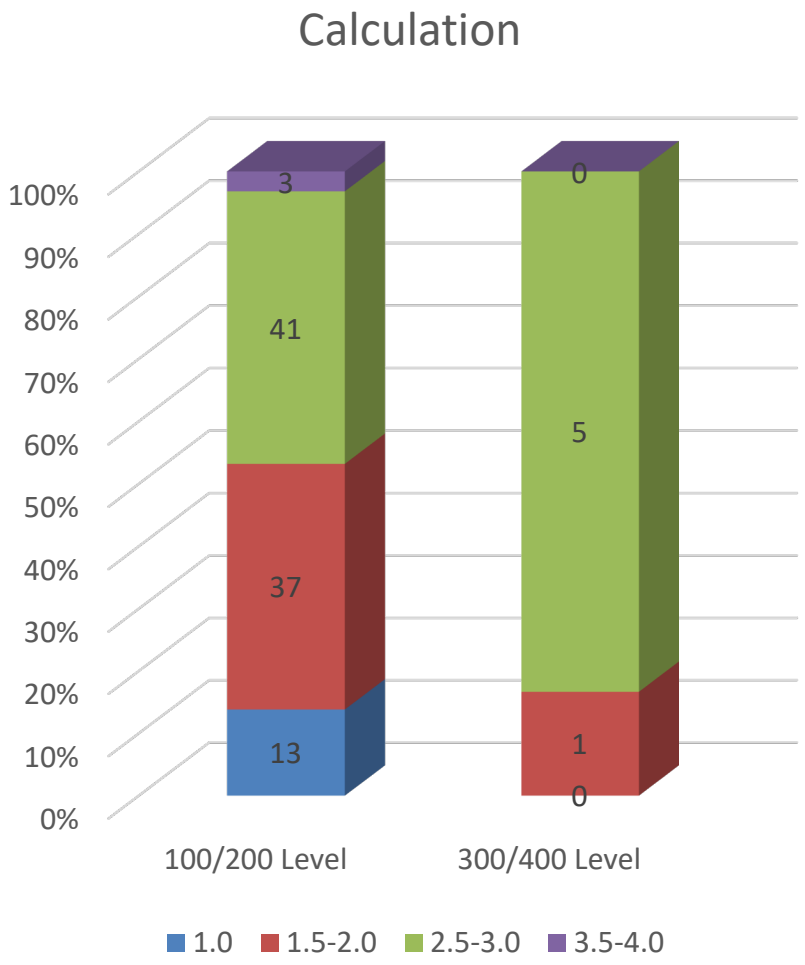




Quantitative Thinking

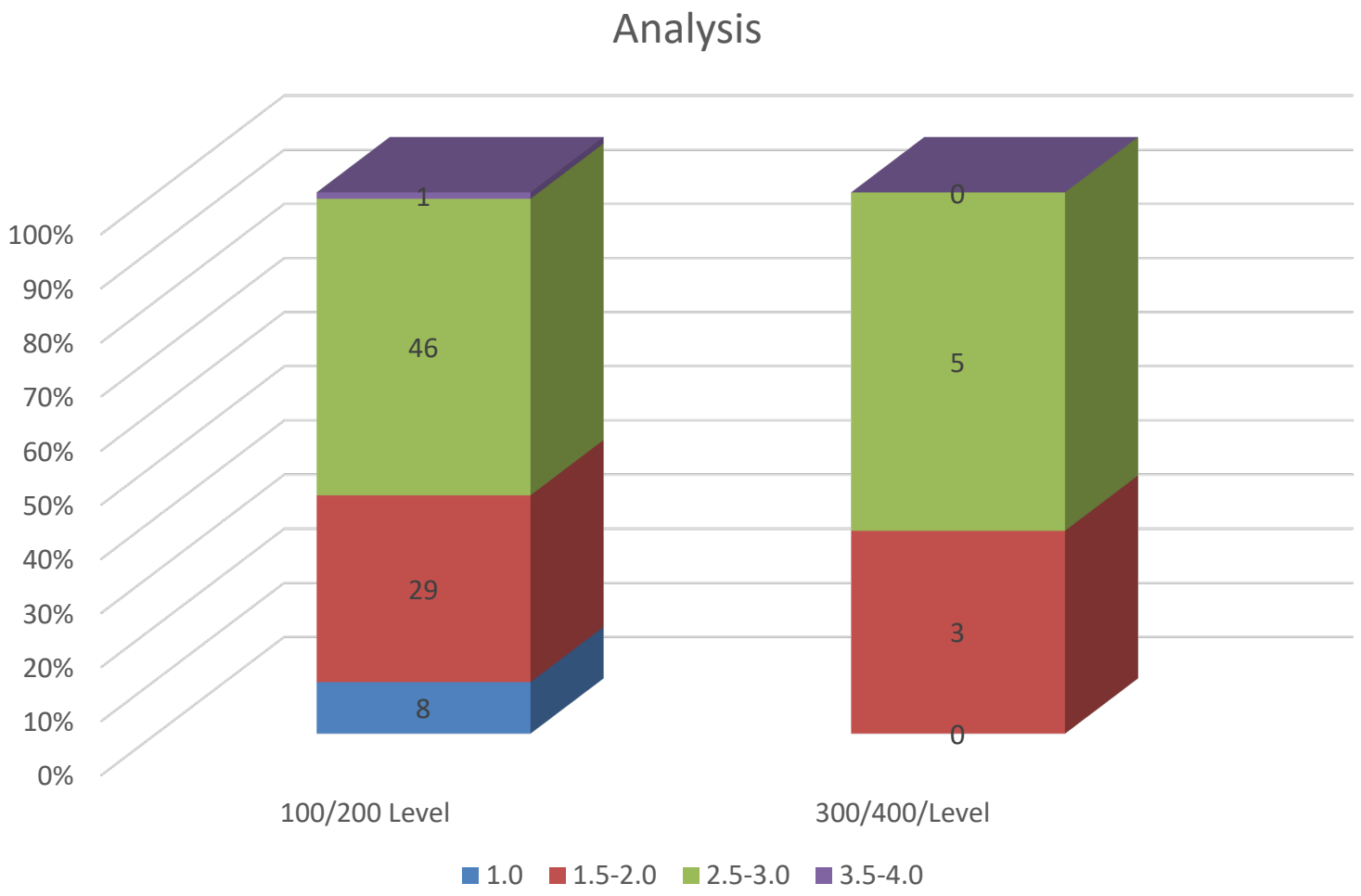
Frequency Analysis by Course Level





Quantitative Thinking

Frequency Analysis by Course Level



Quantitative Thinking

Inter-Rater Agreement Results

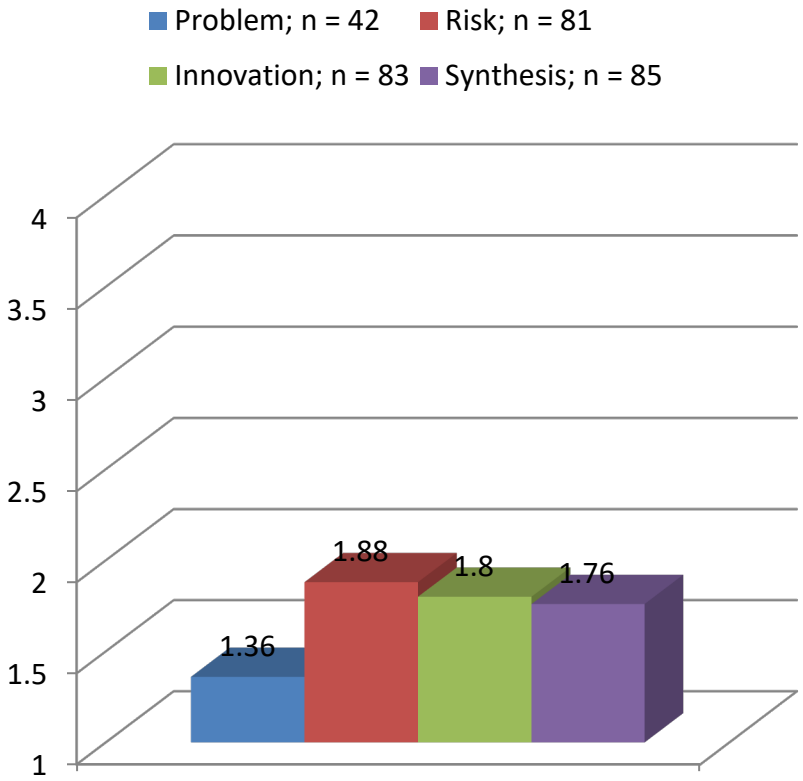
Trait/ Performance Level	Context Kappa Liberal = .777	Interpretation Kappa Liberal = .731	Representation Kappa Liberal = .740	Calculation Kappa Liberal = .710	Analysis Kappa Liberal = .775
Agree on score	29 (23%)	41 (32%)	58 (45%)	57 (45%)	38 (30%)
Difference = 1 point	55 (43%)	32 (25%)	25 (20%)	24 (19%)	40 (31%)
Difference = 2 points	11 (9%)	11 (9%)	4 (3%)	7 (5%)	3 (2%)
Difference = 3 points	0	1 (1%)	0	1 (1%)	1 (1%)
Agree on Score of 0 or error	20 (16%)	26 (20%)	17 (13%)	16 (13%)	26 (20%)
Score + 0	13 (10%)	17 (13%)	24 (19%)	20 (18%)	23 (16%)
Total	128	128	128	128	128

Course Type Analysis

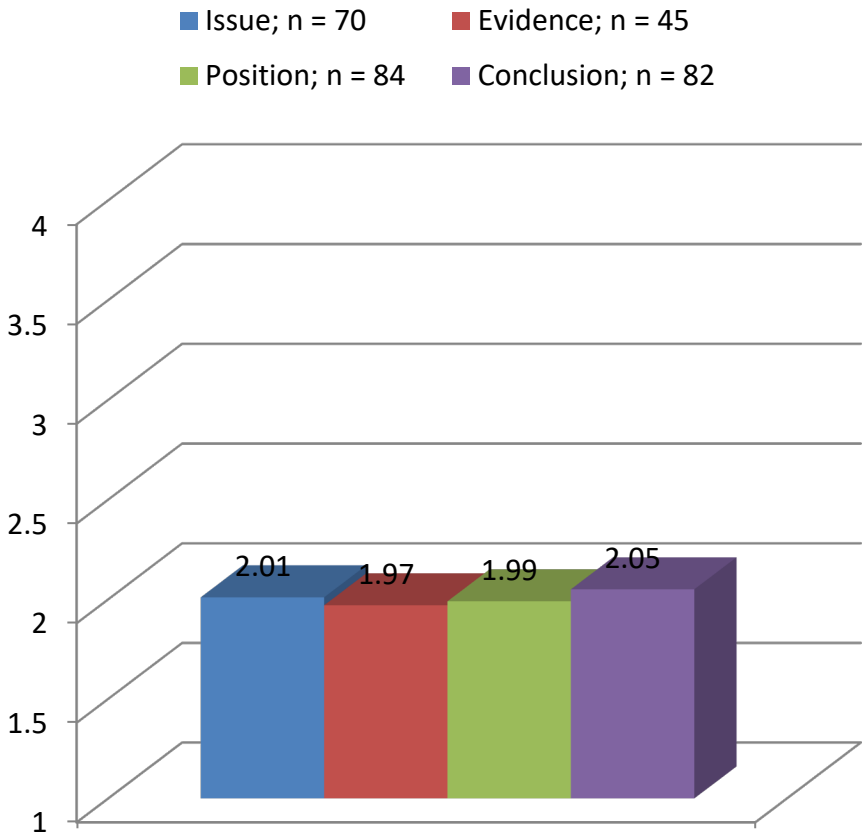
CT Courses

Mean Scores on a scale of 1 – 4, with 4 being the highest possible score. All CT courses are 100/200 Level. Some artifacts aligned to Creative and IB Thinking were from courses that, in addition to being CT, also were Core II, Writing Intensive, MC, INT, and/or Honors.

Creative Thinking



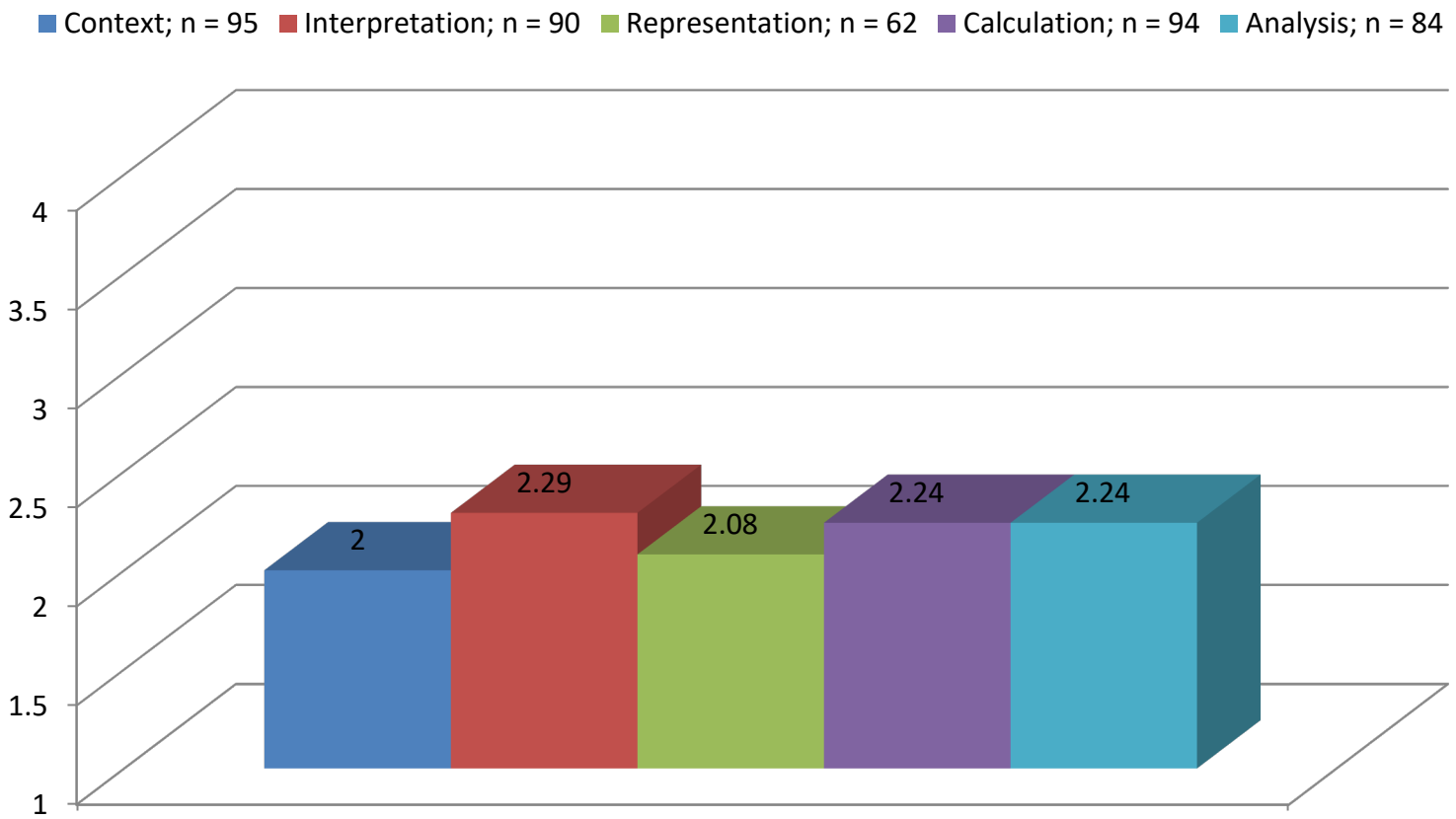
Inquiry-Based Thinking



CT Courses

Mean Scores on a scale of 1 – 4, with 4 being the highest possible score. Mean Scores on a scale of 1 – 4, with 4 being the highest possible score. All CT courses are 100/200 Level. Some artifacts were from courses that, in addition to being CT, also were Core II courses.

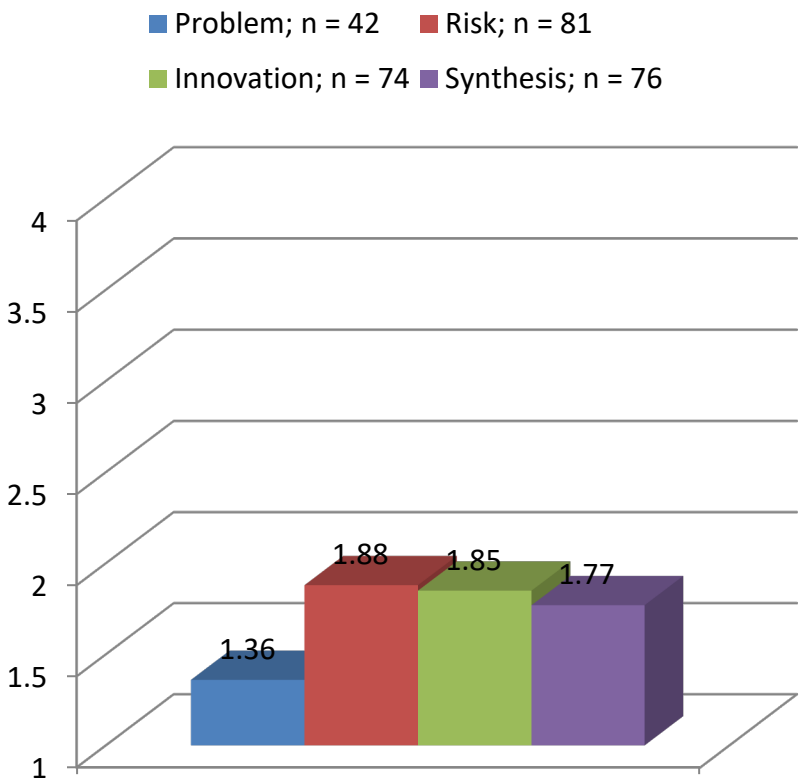
Quantitative Thinking



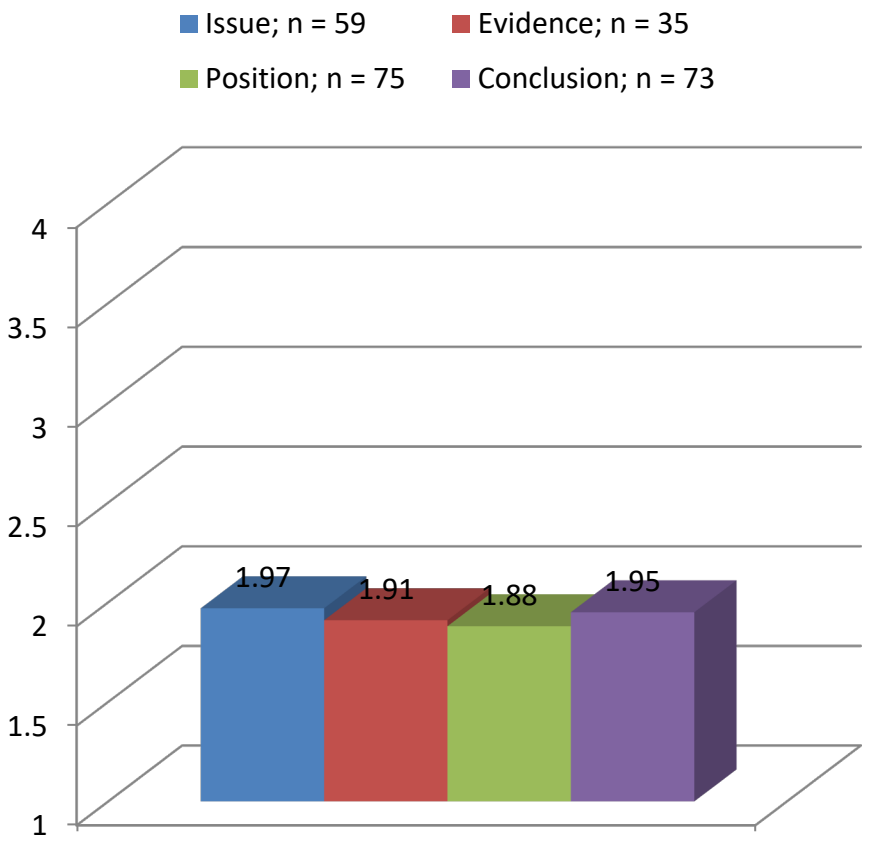
Core II Courses

Mean Scores on a scale of 1 – 4, with 4 being the highest possible score. All Core II courses are 100/200 Level. Some artifacts aligned to Creative and IB Thinking were from courses that, in addition to being Core II, also were CT, Writing Intensive, MC, INT, and/or Honors.

Creative Thinking



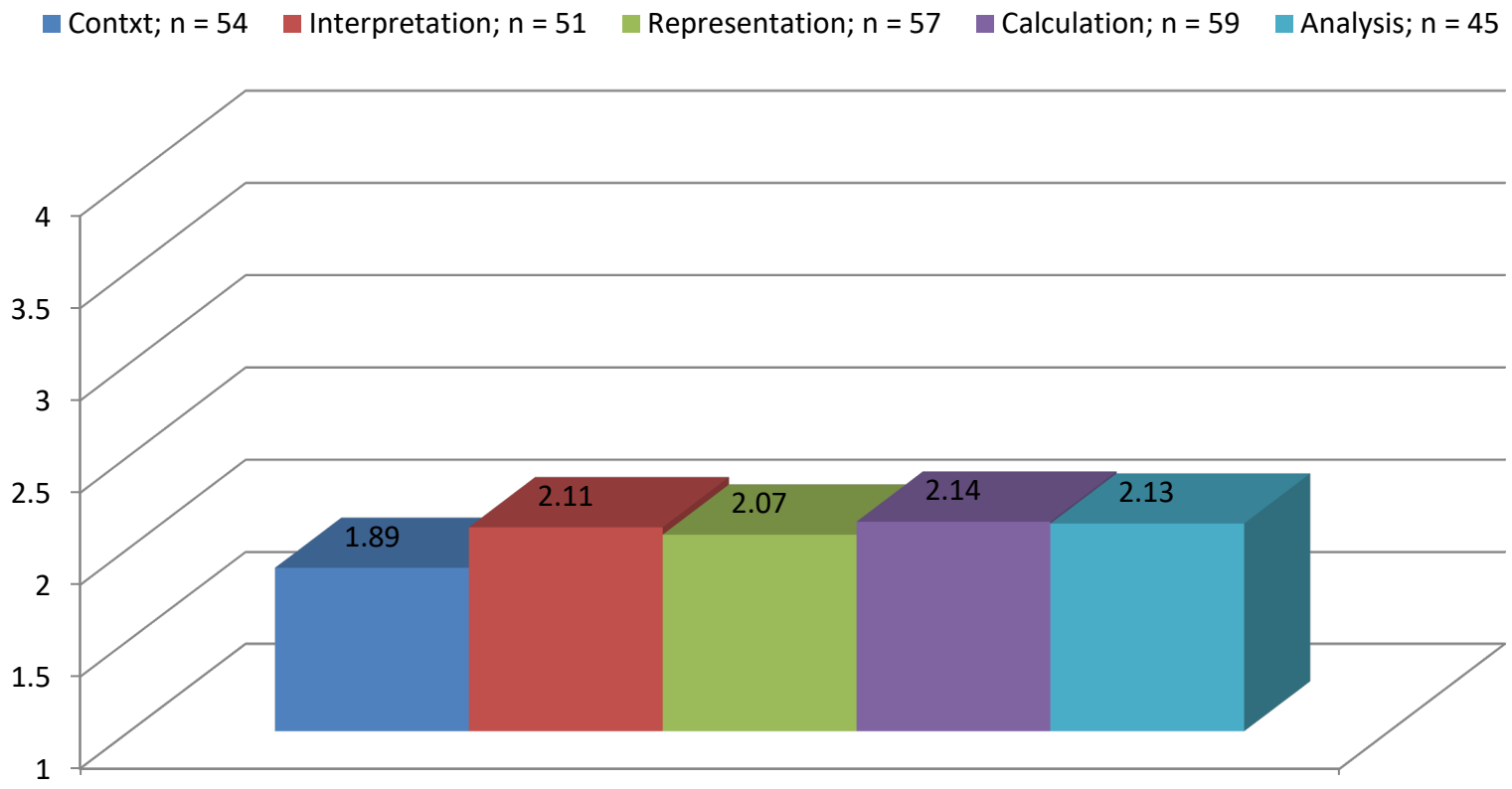
Inquiry-Based Thinking



Core II Courses

Mean Scores on a scale of 1 – 4, with 4 being the highest possible score. All Core II courses are 100/200 Level. Some artifacts were from courses that, in addition to being Core II, also were CT courses.

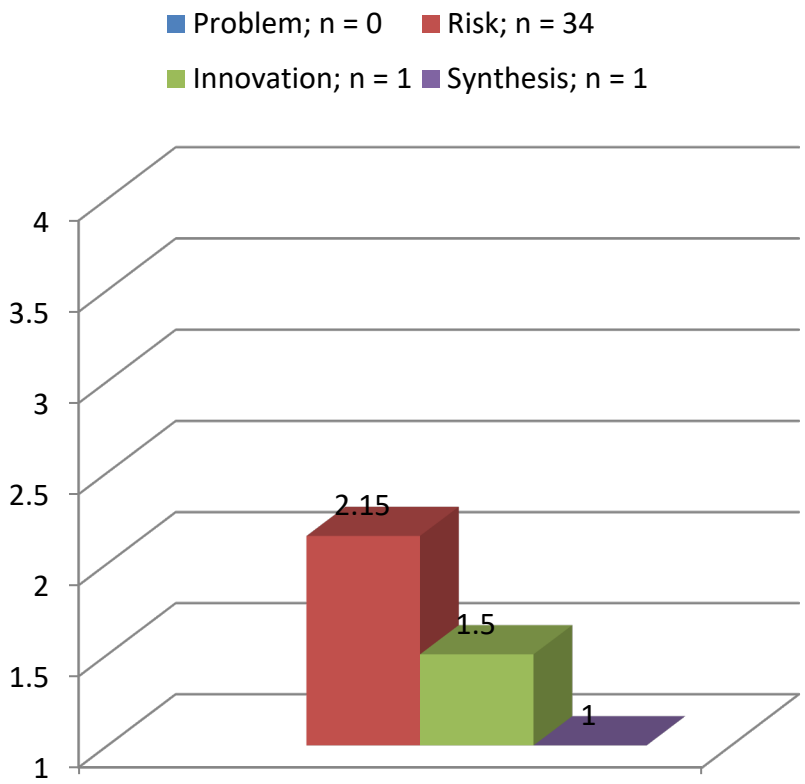
Quantitative Thinking



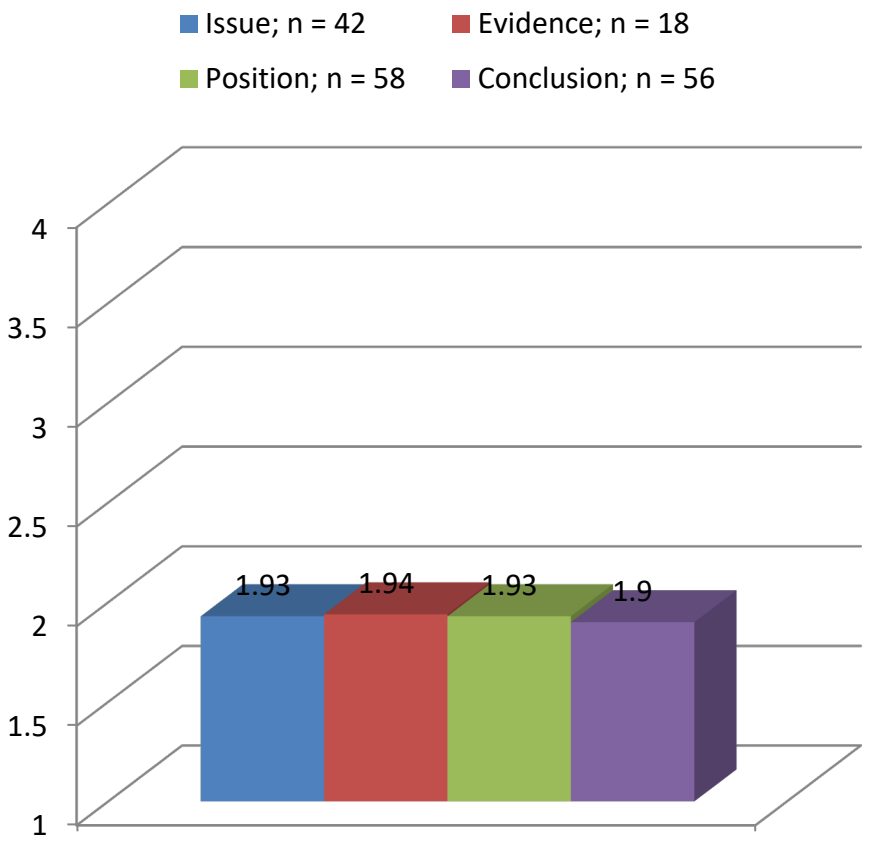
Multicultural Courses

Mean Scores on a scale of 1 – 4, with 4 being the highest possible score. Some artifacts aligned to Creative and IB Thinking were from courses that, in addition to being MC, also were WI, CT, and/or Core II.
Note: There were no MC course artifacts aligned to Quantitative Thinking in this sample.

Creative Thinking



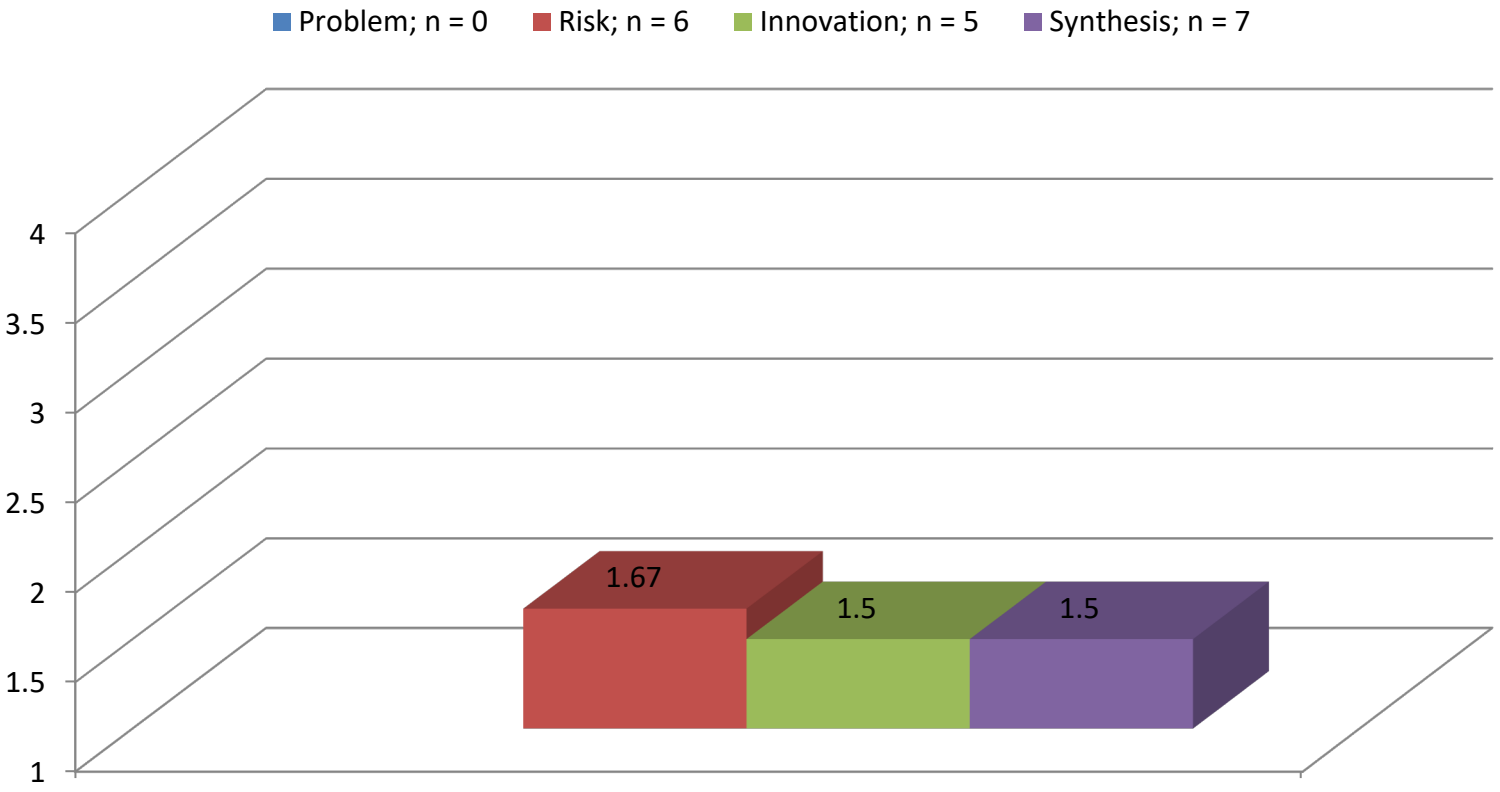
Inquiry-Based Thinking



International Courses

Mean Scores on a scale of 1 – 4, with 4 being the highest possible score. Some artifacts were from courses that, in addition to being International, also were CT and/or Core II. Note: There were no INT course artifacts aligned to either Inquiry-Based or Quantitative Thinking.

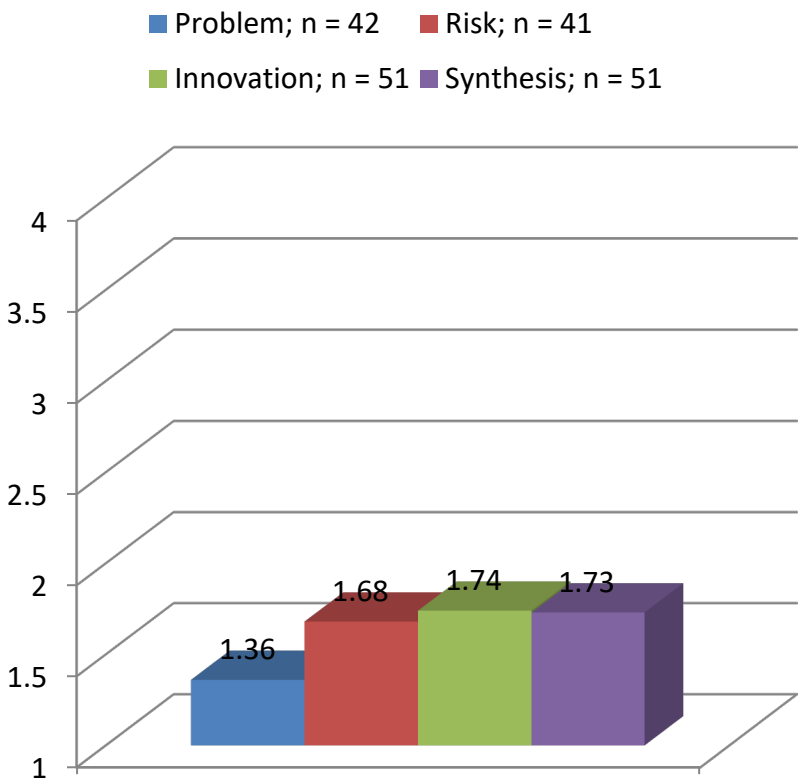
Creative Thinking



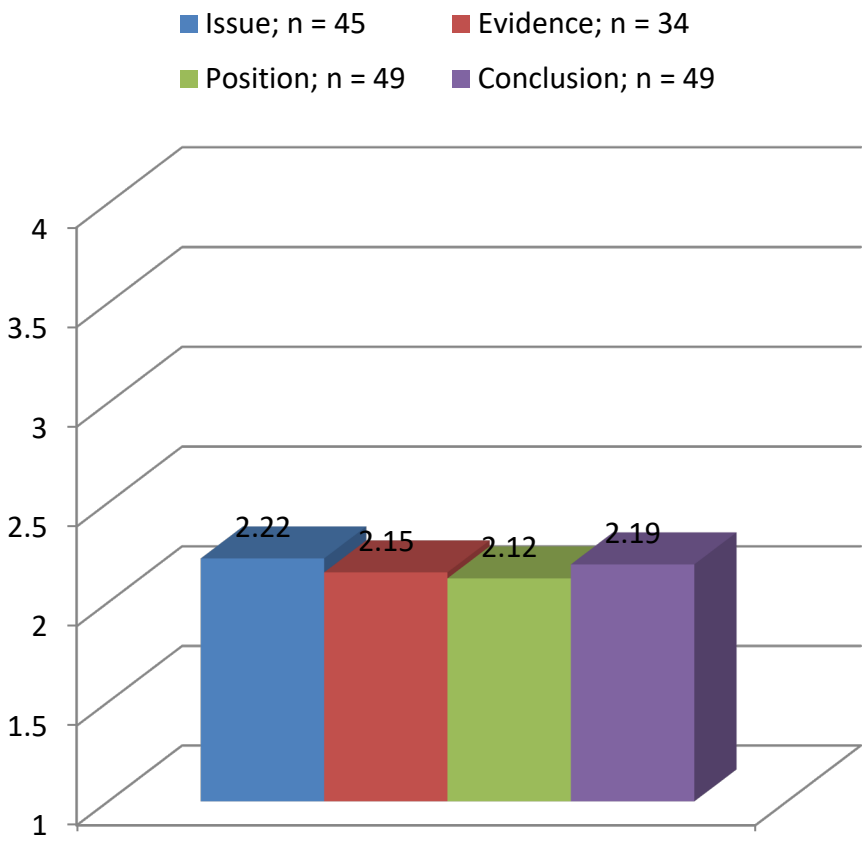
Writing Intensive Courses

Mean Scores on a scale of 1 – 4, with 4 being the highest possible score. Some artifacts aligned to Creative and IB Thinking were from courses that, in addition to being WI, also were CT, Core II, and/or honors.
Only two artifacts aligned to some of the traits of Quantitative Thinking came from WI courses.

Creative Thinking



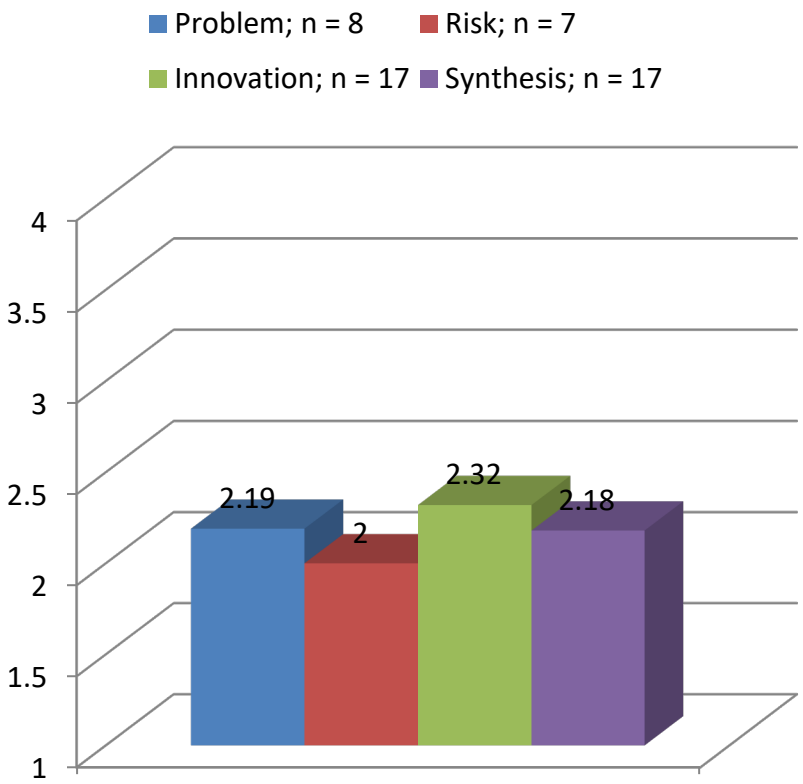
Inquiry-Based Thinking



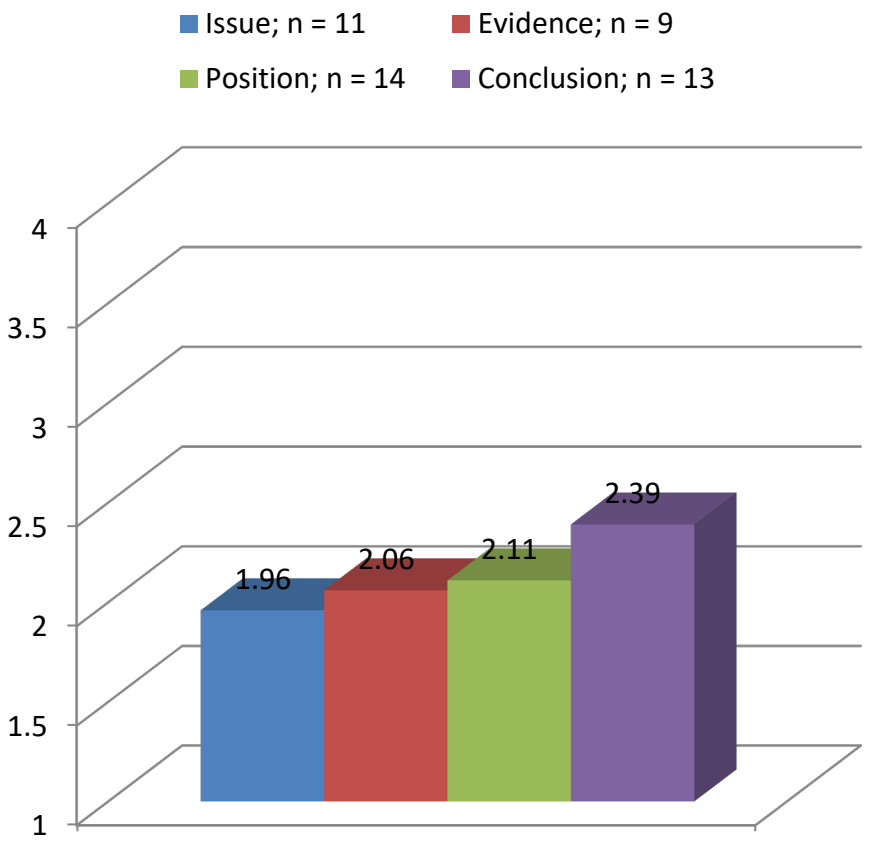
Honors Courses

Mean Scores on a scale of 1 – 4, with 4 being the highest possible score. Some artifacts drawn from Honors courses aligned to Creative and IB Thinking also were courses designated as CT, WI, and/or Core II.

Creative Thinking



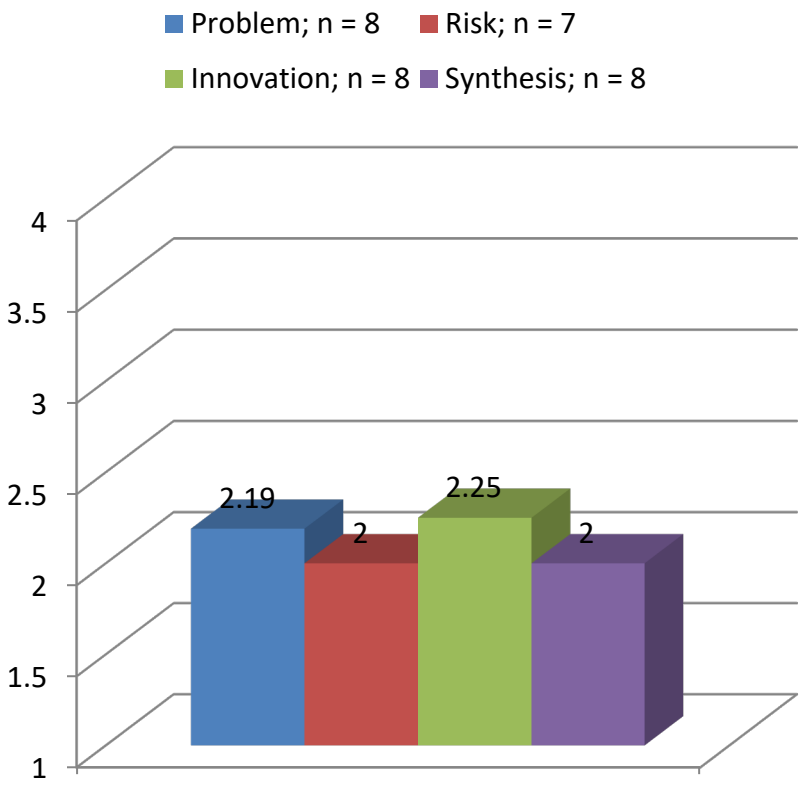
Inquiry-Based Thinking



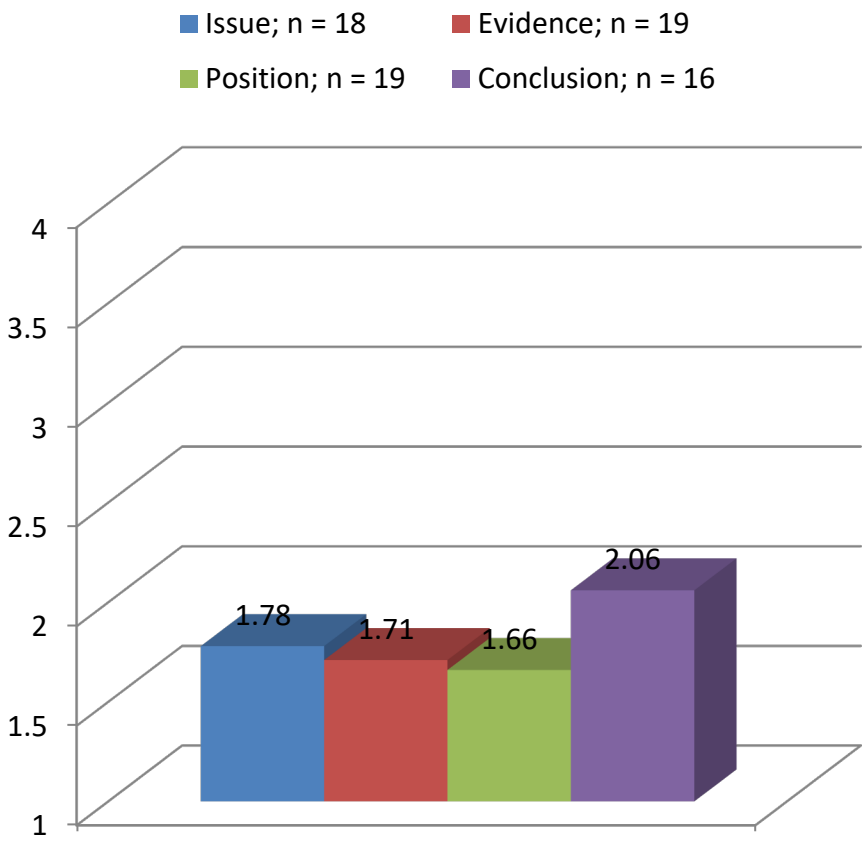
First Year Seminar (FYS) in Critical Thinking

Mean Scores on a scale of 1 – 4, with 4 being the highest possible score. Three artifacts aligned to IBT were drawn from an Honors section of FYS.

Creative Thinking: Note-all Creative Thinking artifacts from FYS were from an Honors section.



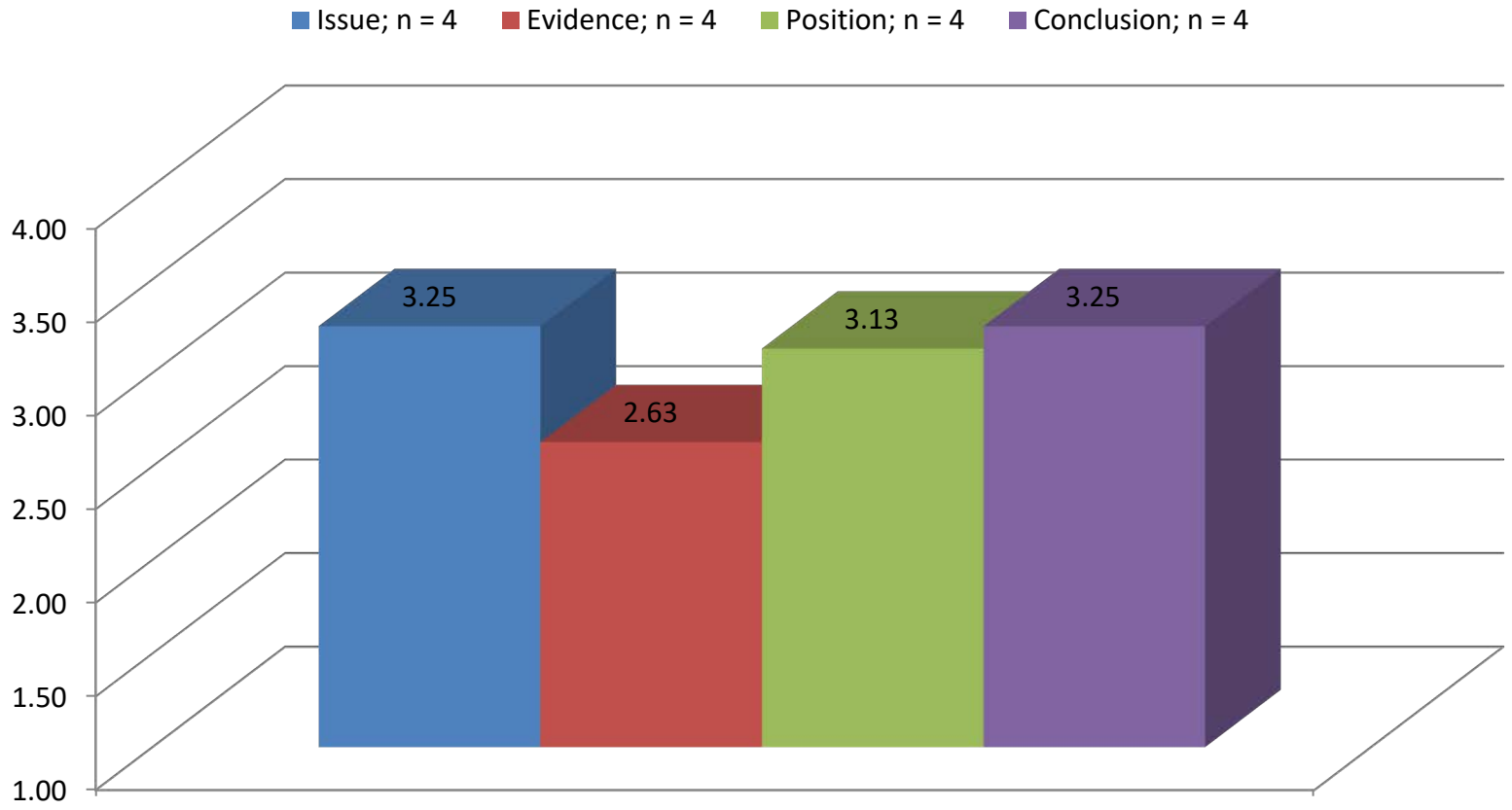
Inquiry-Based Thinking



Capstone Courses

Mean Scores on a scale of 1 – 4, with 4 being the highest possible score. These four capstone artifacts came from a course also designated as International.

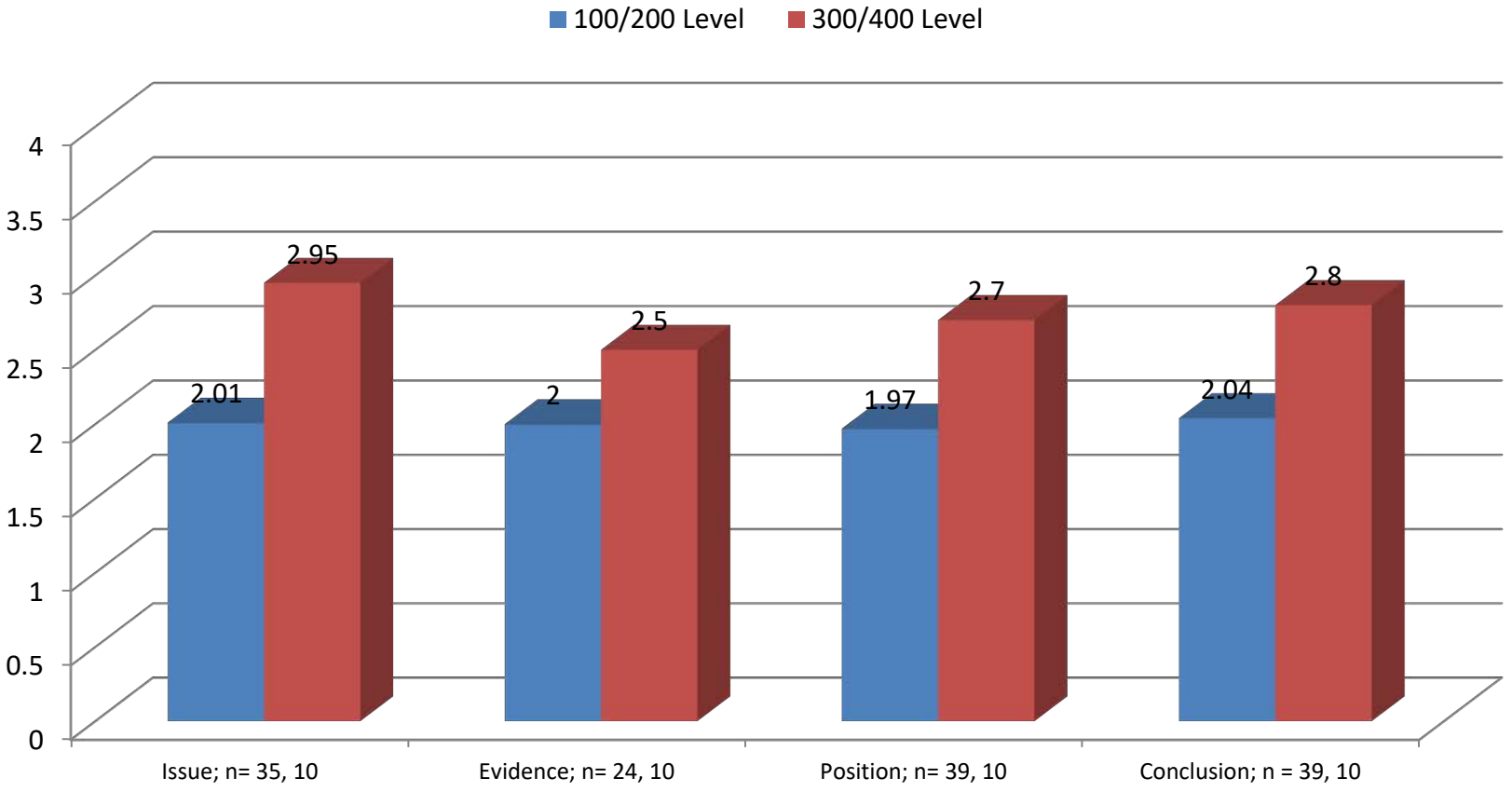
Inquiry-Based Thinking



Writing Intensive Courses: Course Level Comparisons

Mean Scores on a scale of 1 – 4, with 4 being the highest possible score. Mean Scores on a scale of 1 – 4, with 4 being the highest possible score.

Inquiry-Based Thinking



Reference

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Association of American Colleges and Universities (AAC&U). (2009). *Inquiry and analysis VALUE rubric.* Retrieved from https://www.aacu.org/value/rubrics/quantitative-literacy

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