

QL in general education –

Quantitative literacy is the ability to describe, critique, analyze and interpret the interplay between quantitative information and the context around the information.

Since QL requires context, it must be embedded within context to be assessed. See the example of **SSC 101 Assessment – *Analyzing Social Stratification in the Urban Environment***. (Note that the Assessment design follows the design process steps of outcomes, general criteria, prompt, mode, specific criteria, directions, feedback & self assessment).

Linking QL to major outcomes –

Alverno College QL outcomes can be tracked from the college level broad statements to specific assessment level criteria. The first example, **Quantitative Literacy Outcomes in Sociology**, shows the QL outcomes, all SOC dept outcomes, all Research methods course outcomes, and all survey research methods assessment criteria with tracking of outcomes through each level.

The second document, **QL outcome linked examples**, contains three examples of assessment prompts with assessment matrices tracking specific QL outcomes as they specifically relate to the assessment. They do not include outcomes/criteria not related to QL.

Lessons learned –

Assessment results and student self assessment results provide important information for both students and faculty. **Lessons we have learned** contains quotes and responses based on this feedback.

SSC 101 Assessment

Analyzing Social Stratification in the Urban Environment

Students: First year, general education students

Outcomes (Institution level Quantitative Literacy Criteria):

- Student interprets quantitative models such as formulas, graphs and tables and draws inferences from them.
- Student thinks critically about her own and others' use of quantitative information and language.
- Student integrates quantitative abilities to effectively communicate information and respond to problems within a discipline related context.

General Criteria (Course level criteria related to Quantitative Literacy):

- Student makes systematic observations of and inferences about social life.
- Student uses social scientific concepts – the language of the social science disciplines – to describe and analyze observations.
- Student practices the basic skills of social research in order to acquire more accurate and appropriate data upon which to base your interpretations of social patterns.

Prompt: Is Reich's portrait of how different social classes relate in American cities accurate for Milwaukee? Your task in this assessment is to demonstrate that you can effectively analyze how social stratification operates in and around Milwaukee. Your analysis process will consist of testing whether Robert Reich's ideas about social inequality, as set forth in his article "Secession of the Successful," seem to apply to the Milwaukee metro area.

Mode: Five page written paper

Specific Criteria (Assessment level criteria):

- Student accurately and appropriately applies quantitative indicators of social stratification to examine patterns of inequality in the Milwaukee metro area.
- Student provides appropriate qualitative, visual data to examine patterns of inequality in the Milwaukee metro area and analyzes them.
- Student makes meaningful comparisons between points being made in the quantitative and qualitative data and your experience.
- Student accurately uses at least four social scientific concepts to explore whether Reich's thesis applies to the case of the Milwaukee metro area.

Directions:

- Read "Secession of the Successful" by Robert Reich and summarize the main points of the article.

- Explore zip code demographic data to identify at least four quantitative indicators that could provide evidence for your argument.
- Select at least two zip codes that could tell you something about social stratification in Milwaukee and would be good tests of Reich's theory. Include a map of your areas.
- Include a table of data and discuss the meaning and importance of these data, relative to your analysis of Reich's theory.
- Take pictures of visual aspects or elements of material culture that seem to you to symbolize the nature and extent of social stratification. Include the pictures in your paper.
- Use your quantitative and qualitative data to explain whether you think Reich's ideas apply to Milwaukee.
 - Thought questions
 - Which demographic indicators did you select to investigate possible social stratification? Why?
 - Which zip codes did you select to investigate possible social stratification? Why?
 - What do the indicators say about life in your zip codes? (Explain what the numbers and computed results mean within context.)
 - How does your quantitative information strengthen any qualitative information you gathered by exploring the zip codes you selected?
- Use at least four social science concepts that are appropriate and useful in helping you analyze social stratification in Milwaukee.
- Follow APA format. Site your sources and include a bibliography with your paper.

Feedback & Self Assessment:

- Student responds to each criterion in writing. She examines her demonstration each criterion on this assessment, and provides specific evidence of where and how well she met the criteria. The student also indicates a plan for further improve similar papers and/or analytic skills.

Instructor provides written feedback on students work on each criterion.

Quantitative Literacy Outcomes in Sociology

Alverno College ability - based quantitative literacy outcomes:

- C1. Uses arithmetic and algebraic methods to solve problems accurately
- C2. Interprets math models such as formulas, graphs and tables and draws reasonable inferences from them
- C3. Thinks critically about her own and others' use of quantitative information and language
- C4. Integrates quantitative abilities to effectively communicate information and respond to problems within a discipline related context

Sociology Department major outcomes:

- S1. Analyzes the interdependence of peoples and societies in their ecological context (C2, C3)
- S2. Participates effectively in community life
- S3. Conducts social research (C1, C2, C3, C4)
- S4. Exercises social imagination
- S5. Articulates her social philosophy and refines it in dialogue with others (C3)

Behavioral science research methods course outcomes:

- R1. Student correctly identifies variables and accurately distinguishes between variables, values, units of measurement, and individual cases. (S3, C3)
- R2. Student accurately explains the importance of representative samples and accurately describes how random sampling methods provide such samples. (S3, C2, C3)
- R3. Student designs and carries out a valid, reliable survey, including conceptualization, survey design, sampling, data collection and coding. (S3, C3)
- R4. Student accurately and clearly reports the results from a number of different kinds of measures choosing appropriate methods from tables, graphs, and statistics. (S3, C2, C4)

Survey research assessment criteria:

- A1. Student presents a clearly focused, researchable question that is appropriate for survey research. (C3, S3, R1, R3)
- A2. Student develops well-constructed, valid and reliable questionnaire items that are directly related to her research question. (C3, S3, R3)
- A3. Student selects an appropriate sample and presents reasonable justification for her decisions. (C3, S3, R3)
- A4. Student accurately identifies ethical issues pertinent to the focus of her inquiry and justifies decisions she made for ensuring ethical research practice. (S3, R3)
- A5. Student accurately analyzes her data using SPSS. (C2, C3, S3, R3)
- A6. Student writes an accurate APA style research report. (C2, C4, S1, S3, R4)

2006 Demographic Data, Milwaukee Wisconsin (by Zip Code)
 SSC 101 Assessment Project Alverno College Q/L Program

* 2006 data	53045	53129	53150	53203	53204	53205	53206	53212	53213	53218	53219	53223	53224	53233
Area (square miles)	17.3	5.3	34	0.4	3.6	1.2	2.6	3.3	3.4	7	5.3	10.4	8.8	1.6
Households	8,376	5,845	8,443	468	12,527	3,534	10,390	12,309	11,345	14,355	15,429	12,349	7,174	5,139
Population	22,580	13,807	23,555	681	43,358	10,249	31,678	30,733	25,886	40,740	32,466	29,391	19,174	15,621
Population density (calculate people/sq mile)	1,305	2,605	693	1,703	12,044	8,541	12,184	9,313	7,614	5,820	6,126	2,826	2,179	9,763
People per household (calculate people/household)	2.7	2.4	2.8	1.5	3.5	2.9	3.0	2.5	2.3	2.8	2.1	2.4	2.7	3.0
White alone (%)	92.2	94.6	97.5	69.5	39.3	3.1	1.0	23.0	91.1	21.9	92.5	51.2	38.7	45.5
Black alone (%)	1.0	0.5	0.2	17.9	9.9	88.9	97.0	67.7	3.3	68.1	1.5	41.4	53.9	41.8
American Indian alone (%)	0.0	0.2	0.2	0.0	1.9	0.2	0.2	0.6	0.3	0.4	0.7	0.4	0.5	0.6
Asian/Pacific Islander alone (%)	5.5	3.1	0.8	8.5	3.8	5.0	0.4	0.9	2.4	6.3	1.1	3.5	3.0	7.2
Some other race alone (%)	0.3	0.8	0.5	1.0	39.4	1.5	0.4	5.3	1.0	1.1	2.3	1.2	1.3	2.9
Two or more races (%)	1.0	0.9	0.8	3.1	5.7	1.3	1.1	2.5	1.8	2.3	1.8	2.3	2.6	2.1
Hispanic origin (%)	1.3	3.3	1.9	3.2	68.3	3.6	1.2	10.9	3.2	3.0	6.2	3.2	4.2	5.4
Male (%)	47.3	47.0	49.4	61.1	53.1	45.8	45.1	47.2	46.8	45.8	47.7	46.3	46.8	53.6
Female (%)	52.4	53.0	50.6	38.9	46.9	54.2	54.9	52.8	53.2	54.2	52.3	53.7	53.2	46.4
Married with children (%)	33.4	24.0	34.0	0.0	23.8	9.5	10.2	9.5	23.9	17.8	16.9	17.5	21.1	4.2
Single with children (%)	3.5	5.0	5.7	4.1	19.4	29.8	29.5	23.2	6.1	23.9	6.2	10.3	18.4	12.0
Cost of living compared to US (%)	122.6	105.5	110.8	109.6	76.8	77.4	74.9	78.4	101.0	81.7	92.3	91.7	93.9	76.3
Median household income	\$ 96,706	\$ 66,764	\$ 79,622	\$ 63,444	\$ 30,637	\$ 18,594	\$ 24,546	\$ 28,810	\$ 64,077	\$ 39,059	\$ 49,626	\$ 53,577	\$ 50,992	\$ 16,651
HH income under \$50,000 (%)	70.4	34.0	22.6	41.0	74.0	85.3	79.6	73.9	36.2	63.3	50.4	45.7	48.9	88.4
HH income over \$100,000 (%)	48.3	25.1	32.2	27.8	5.2	2.7	4.1	5.5	24.2	7.0	10.9	16.0	14.5	2.5
median home value	\$ 402,052	\$ 242,205	\$ 282,887	\$ 344,753	\$ 74,510	\$ 80,338	\$ 62,197	\$ 93,922	\$ 209,980	\$ 94,512	\$ 158,506	\$ 148,781	\$ 158,972	\$ 106,638
Homes owned (%)	82.4	66.3	80.1	12.9	24.3	20.2	33.1	27.0	63.4	57.3	62.3	55.4	47.0	2.9
Homes rented (%)	14.8	29.5	17.5	62.6	63.5	65.6	54.9	60.6	32.8	37.7	33.9	39.8	44.1	86.8
Homes vacant (%)	2.8	4.2	2.4	24.5	12.3	14.3	12.0	12.3	3.9	5.1	3.8	4.8	9.0	10.3
Violent crime risk (1 - 10)	1	2	1	7	7	8	8	8	3	7	6	6	6	7
Property crime risk (1 - 10)	2	5	2	6	7	7	7	7	6	7	7	3	4	6

http://www.esri.com/data/community_data/community-tapestry/index.html

<http://www.bestplaces.net/zip-code/>

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QL outcome linked examples

Understanding terrorism position paper:

A major project in this course involves a simulation in which you represent an NGO that is working in a country/region on a terrorism-related issue. Your task is to create a position paper that shows the importance of the issue in the country/region and defends your NGO's position on the issue in the country/region.

Homeless experience:

As part of the mental health experience, you will be engaged in an "active" process exploring the issues surrounding the homeless and chronically mentally ill people in the community. You will also visit various community agencies that provide services for individuals and families in need of care and shelter. As a group, you will present and discuss your findings on prevalence of homelessness and mental illness in the Milwaukee area, issues and laws governing mental health services, and information on the community agencies that you visit. Your audience will be other nursing students in the class.

Why farming?

Includes extensive context setting on the shift from hunting/gathering to agriculture We still know that and when the transition to agriculture occurred, but we have not learned why hunters and gatherers would have wanted to make the change. Perhaps what we should be looking for is some way to compare features of the hunting and gathering v agricultural life in order to decide whether the question even makes sense. If there were no advantage to the change, then we are asking the wrong question when we ask why they wanted to become agriculturalists. Instead, we will need to ask what made it necessary for them to become agriculturalists. Let's try to make use of the following ethnographic data about primitive groups of hunters and gatherers and of agriculturalists that have been studied by anthropologists during the 20th century, relying on the assumption that, living in relative isolation from the modern world, they preserve aspects of the lives of their Stone Age ancestors. Create some comparisons between primitive agricultural and hunting and gathering societies to offer an answer to the question of whether or not hunters and gatherers would have wanted to convert to an agricultural way of life. Your group will present your findings with supporting quantitative evidence to explain what your comparisons signify.

Assessment Matrix – Understanding terrorism position paper

<u>QL Outcomes</u>	<u>Generic Criteria</u>	<u>Assessment Criteria</u>	<u>Assessment Specific</u>
<p>1. The student thinks critically about her own and others use of quantitative information.</p>	<p>1. Uses others' perspectives and discipline frameworks and concepts to engage in an informed critical discussion about the implications of diversity and interconnection in the world.</p>	<p>1. Analyze key factors related to your region so you can explain the causes and consequences of the issue.</p> <p>2. Analyze key factors related to your issue so you can effectively defend your NGO's position on it.</p>	<p>Format / Directions</p> <p>1. Submit an 8 page, 12 font, double spaced paper.</p> <p>2. Include at least one map.</p> <p>3. Organize data into tables, charts or diagrams.</p> <p>4. Use at least 10 sources.</p>
	<p>2. Describes and uses the functioning principles of organizations to articulate how governmental and non-governmental sectors form public and social policy.</p>	<p>1. Analyze your NGO, including background, activities and position, to understand how it influences policy.</p>	<p>5. Include a bibliography.</p>
<p>2. The student integrates quantitative abilities to effectively communicate information and respond to problems within a discipline context.</p>	<p>1. Draw on diverse and credible sources to develop and articulate your own perspective about diversity and global inter-connectedness.</p>	<p>1. Use economic, geographic, social, cultural factors to explain the causes and consequences of your issue.</p> <p>2. Use evidence to make a compelling argument that explains how the issue in the country is related to terrorism.</p>	

Assessment Matrix Homeless Experience

<u>QL Outcomes</u>	<u>QL Generic Criteria</u>	<u>QL Academic Criteria</u>	<u>Assessment Specific</u> Format / Directions
1. The student thinks critically about her own and others use of quantitative information.	<ol style="list-style-type: none"> Gathers appropriate quantitative information regarding the homeless and chronically mentally ill in Milwaukee Analyze the current political, social and economic issues related to the homeless and chronically mentally ill individuals in the community 	<ol style="list-style-type: none"> Identifies appropriate indicators for the condition of homeless and chronically mentally ill in Milwaukee Identifies appropriate quantitative relationships related to the homeless and mentally ill 	<ol style="list-style-type: none"> Take a walking tour of your assigned area, observing location, age, sex, appearance of homeless, available shelter elements, etc. Visit Milwaukee Public Library to gather information on laws governing mental health services, etc Visit assigned community agencies and gather information on goals, staffing, funding, clients, etc. Present findings to class. Include media of quantitative information, which clarifies and supports your presentation
2. The student integrates quantitative abilities to effectively communicate information and respond to problems within a discipline context.	<ol style="list-style-type: none"> Present current statistics and information regarding the homeless population in the Milwaukee area 	<ol style="list-style-type: none"> Uses basic quantitative abilities to accurately interpret the identified quantitative relationships Chooses appropriate representations to communicate quantitative information to classmates 	

Assessment Matrix Why Farming

<u>QL Outcomes</u>	<u>QL Generic Criteria</u>	<u>QL Academic Criteria</u>	<u>Assessment Specific</u>
<p>1. The student thinks critically about her own and others use of quantitative information.</p>	<p>1. Thinks critically about historians use of quantitative information and language to determine patterns, trends and direction</p> <p>2.</p>	<p>1. Identified appropriate quantitative relationships with historical data</p> <p>2. Makes reasonable assumptions regarding “missing data” based on knowledge of history and available data</p> <p>3. Uses data to make reasonable comparisons between primitive agricultural and hunting and gathering societies</p>	<p>Format / Directions</p> <p>Use provided data for comparisons.</p> <p>Include quantitative data in charts or graphs.</p> <p>Create a group presentation with supporting quantitative evidence to explain what your comparisons signify.</p>
<p>2. The student integrates quantitative abilities to effectively communicate information and respond to problems within a discipline context.</p>	<p>1. Uses quantitative abilities effectively to communicate evidence supporting your historical interpretations</p>	<p>1. Uses supporting quantitative evidence to explain advantages and disadvantages of each type of economy</p> <p>2. Creates appropriate graphic forms to illustrate your comparisons.</p> <p>3.</p>	

Lessons we have learned

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Faculty observations based on assessing for quantitative literacy in their discipline courses

- “We need to make sure students understand quantitative reasoning and quantitative strategies as tools rather than as ends in themselves.”
 - Teaching change: *“Faculty need to emphasize meaningful use of quantitative strategies rather than tasks that are nothing more than arithmetic gymnastics.”*
 - Assessment directions change: *“Your purpose is not to show that you can manipulate all of the data; instead it is to use numerical data to help you think more clearly about the problem.”*
 - Potential inservice need: *Some faculty need help with their own confidence with quantitative literacy. They need to be able to talk through ideas with others who are incorporating quantitative literacy into their courses.*

- “We need to make students much more aware of their own thinking process by calling attention to it.”
 - Teaching change: *“We need to explicitly indicate use of these strategies in our courses because students don’t always recognize that they are using quantitative abilities when performing a specific task in a discipline course.”*
 - Assessment directions change: *“Narrate your problem solving process clearly explaining your way of thinking about your use of quantitative thinking.”*

- “We need to model analysis for students to teach them ‘how to make appropriate choices amount quantitative strategies.’”
 - Teaching change: *“We need to give [students] an opportunity to practice quantitative reasoning with instructor and peer feedback.”*
 - Assessment direction change: *“Select an appropriate quantitative model to represent your data. Explain why you chose the model you selected.”*
 - Potential inservice need: Some faculty need help with available strategies, e.g. Edward Tufte’s Visual Display of Quantitative Information

Student self assessment comments as reported by faculty

- Many students commented that the quantitative reasoning assessment seemed link an “add-on” instead of smoothly filling into the progression of materials I was teaching.
 - Faculty response:
 - “One major assessment was not sufficient to address quantitative literacy... We needed to incorporate multiple experiences spread out over a larger part of the semester.”
 - Coordinator/trainer response:
 - Although we had told faculty that QL in the disciplines would only be successful if it were integrated into the normal folds of the course and not treated as an add – on or as a QL day that they had to get through, it didn’t hit home for the faculty until they experienced the disconnect and heard it from their students. Faculty have moved to treating QL across the curriculum in a much more integrative way – more like writing across the curriculum.
- Faculty shared student self assessment comments like this one: “I look at math differently because I have applied it to everyday situations. I see why math is so important and useful.”
 - Faculty response:
 - “It is important to make their use of quantitative reasoning meaningful. I do think after the assessment, students saw how quantitative reasoning related to the student and application of this course.”
 - “[This work with quantitative literacy] made me realize the importance of working with students and to provide mental energy to continually make data analysis/presentation meaningful.”
 - Through writing and providing feedback on assessments, “I became more and more aware of how much analytic/quantitative reasoning is incorporated in my course.”
 - Coordinator/trainer response:
 - Having faculty hear from students, hear from their colleagues, and witness the importance of relevant use of QL in their classes for themselves was very powerful. They now have a good answer for the question, “Why are we including QL in *this* course?”