Assessment of Student Writing in 1-Credit W Courses at UConn

Findings from Allied Health, Animal Science, Economics, and Nutritional Sciences 2014

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This report delivers findings from a study of UConn student writing in 1-credit writing-intensive (W) courses in the departments of Allied Health, Animal Science, Economics, and Nutritional Sciences. Conducted at the request of the General Education Oversight Committee (GEOC) of the University Senate, this study is part of an ongoing effort to assess learning outcomes in W courses.

The findings in this report are based on student writing collected in 2013-14 and analyzed during the summer of 2014. Results from earlier rounds of assessment are available for download from the GEOC website (geoc.uconn.edu), covering writing outcomes in eight different departments, delivered in four reports: Art History, Human Development and Family Studies, and Political Science, 2008; Nursing, 2009; Freshman English, 2009; and Electrical Engineering and Mechanical Engineering, 2010. Also posted is a 5th report, a meta-analysis of the four studies done between 2008 and 2010 (*Summary Report on the Assessment of Academic Writing at the University of Connecticut*, 2010).

Because all of the earlier rounds focused on 3-credit courses, which is the dominant mode of W course delivery at UConn, we opted to study 1-credit Ws in this round. 1-credit Ws on campus

vary in structure: some stand alone; some function like labs attached to lecture courses. All such courses go through a rigorous initial course approval process but until now none have undergone independent, direct assessment of learning or writing outcomes.

Methods

We collected final student papers from across W sections, stripped them of identifying information, and scored them using 10-item rubrics developed by participating departments. The first 6 items on each rubric reflect the writing priorities of each department, and the final 4 items on each rubric are relatively consistent across departments: editing/mechanics; style; citations; and holistic score. To improve the reliability of scoring, the faculty coordinator and doctoral students from each department engaged a calibration process of scoring 6-8 practice papers. Once reliability was established, two readers scored each paper; in cases where the readers did not agree, a third reader (the faculty coordinator) scored the paper and reconciled any differences.

In addition to rubric scoring, we employed a variety of other qualitative measures:

- discussions within the three-person disciplinary cohorts about both the rubric results and the patterns of strength and weakness that were not captured by the rubric
- "deep audits" of a randomly chosen subset of 8 papers from each department—that is, readers reviewed all the sources in a given paper and evaluated how well students were comprehending and deploying sources (this took 2-3 hours per paper)
- broader discussions among all 14 participants after reading of student papers from 6 different UConn departments; and reflections on how student work from those other departments compared to student writing in their home departments.

We focused on learning outcomes, on what students could do as academic writers by the end of a given course as indicated by the final writing performance/paper for that course (we could not assess how much learning happened *during* a given semester because we did not collect both early/before and late/after papers). We tried to be attentive to the complex nature of writing—that is, we approached writing not only as a set of sub-skills but also as context-dependent mode of learning and communicating that is intertwined with reading, research, content, and information literacy.

A more detailed account of methods for this study is available in the 2008 report and summarized in the 2010 meta-analysis. For this round of assessment, we made two significant changes to earlier methods:

- We collected *all* papers from W sections in the participating departments, not just those from students who consented to participate in the study. In earlier rounds of assessment we administered informed consent and had students complete a questionnaire; about 1/3 opted not to participate, which left open the question of whether we were getting a representative cross-section of UConn writers.
- We did not collect paper grades or student demographic information.

The changes meant omitting some kinds of analysis (for example, sorting by demographic/identity variables, past W-course experiences, grades, or student self-perceptions of

writing ability) but they allowed us to maintain the core of our work (attending directly to student writing), to collect a more complete archive of UConn student writing, and to determine whether past findings were influenced by self-selection bias.

One-Credit Ws: General Findings

While the greatest payoff of this study is in the department-specific findings (see the sections below labeled by department), we discovered some general patterns that GEOC should consider as it deliberates on the future 1-credit W courses:

- *The 1-credit W courses studied were built around rigorous assignments and robust revising processes.* All four courses clearly meet General Education W Guidelines and were consonant with their original course proposals. All demanded long, source-driven final papers; all involved deliberate stages of drafting, instructor feedback, and revising (most involved peer review too); all students engaged in discipline-specific research and writing. The genres assigned were fitting for undergraduate capstone writing experiences: two departments (Animal Science, Nutritional Sciences) required a long literature review; one (Allied Health) required a research proposal with a literature review embedded in it; and one (Economics) required a thesis-driven and source-driven long paper. The 1-credit structure guarantees dedicated class time for the teaching research processes and for workshopping writing, which are sometimes elided in 3-credit W courses.
- *Students are achieving at least minimal proficiency, and in most cases moderate proficiency, on writing-in-the-major outcomes established by the departments.* This suggests that the curricula in these four departments, including the 1-credit W courses, are preparing students to compose, revise and edit as college-level writers in a particular discipline. Consistent with findings of past rounds of W assessment, student performance is clustering in the middle, with relatively few papers rated either unsatisfactory or excellent.
- *Higher order concerns (analysis, argument, source integration, etc.), while minimally proficient, are the most pressing areas of need.* Grammar and mechanics are not the chief writing problems, a pattern which is consistent with findings from earlier rounds of both W and Freshman English assessment.
- *As expected, specific relative strengths and weaknesses vary by department.* For details, see the sections below, which have been reported to the participating departments so that they can be used to provoke evidence-driven curricular reforms and reflections on teaching. Summary findings have already been presented to Allied Health and Nutritional Sciences as part of their August 2014 faculty retreats; Economics and Animal Science will each likely put W results discussion on the agenda of a fall 2014 faculty meeting.
- *Careful source checking—what we called Deep Audits—revealed no pervasive pattern of academic dishonesty but did reveal many intellectual and ethical problems that go unnoticed in typical grading.* Occasions of serious plagiarism were discovered in a few papers, but none were entirely plagiarized; unintentional (though still serious) problems with missing source attribution and improper paraphrasing were common. These patterns of source use and misuse seem reasonably consistent with what *The Citation Project* (http://site.citationproject.net) has been discovering through its analysis of source use in

student writing at a range of colleges and universities. Software such as SafeAssign will not solve these issues; instead, they will require instructors to devote more sustained instruction to teaching undergraduates how to read and deploy sources effectively and ethically.

- *Requiring more sources may not be a pathway to more rigorous research or intellectual work*. On assignments that required a minimum of 5 good sources, students generally used sources much more effectively and scrupulously than those who were required to use a minimum of 10 sources. This is perhaps commonsensical, but it raises an important practical question: How should we weigh the priorities of requiring more sources so that undergraduates are exposed to a suitable range of research against requiring fewer sources so that they can focus on reading and using their sources more carefully? Ideally we would want both, but this study suggests that emphasis on quantity of sources required carries real costs for the quality of how students use sources.
- *The more explicit the integration of the 1-credit course/lab with a companion 2-credit/3-credit course, or with the major curriculum, the better.* Stand-alone 1-credit courses invite motivational problems (students may not take a 1-credit course as seriously); they also present structural challenges (most students compartmentalize their learning, thinking course by course, focusing on grades, but the assignments in these W courses are long and difficult, requiring students to draw on research skills, content knowledge and theory from previous and concurrent courses in the major). If students are not coached *explicitly* on how to draw on previous and/or concurrent coursework to develop their long research/writing projects, most will not make those connections on their own (a similar breakdown can happen when there is little explicit coordination between lecture and lab sections of a science course). Such integration need not come in the form of a 1-credit W/3-credit lecture co-requisite requirement, but that arrangement has proven effective for 3 departments in this study.
- *1-credit Ws are labor-intensive.* Departments considering a move to 1-credit Ws should not do so simply to get more students through the W requirement or squeeze more out of current teaching resources. Graduate instructors, TAs and adjuncts, in particular, need to be protected from being assigned to teach too many W sections. The departments involved in this study treated graduate students and adjunct faculty fairly, keeping teaching loads reasonable and offering mentoring and support. These departments could serve as models for other departments considering 1-credit Ws.

Animal Science

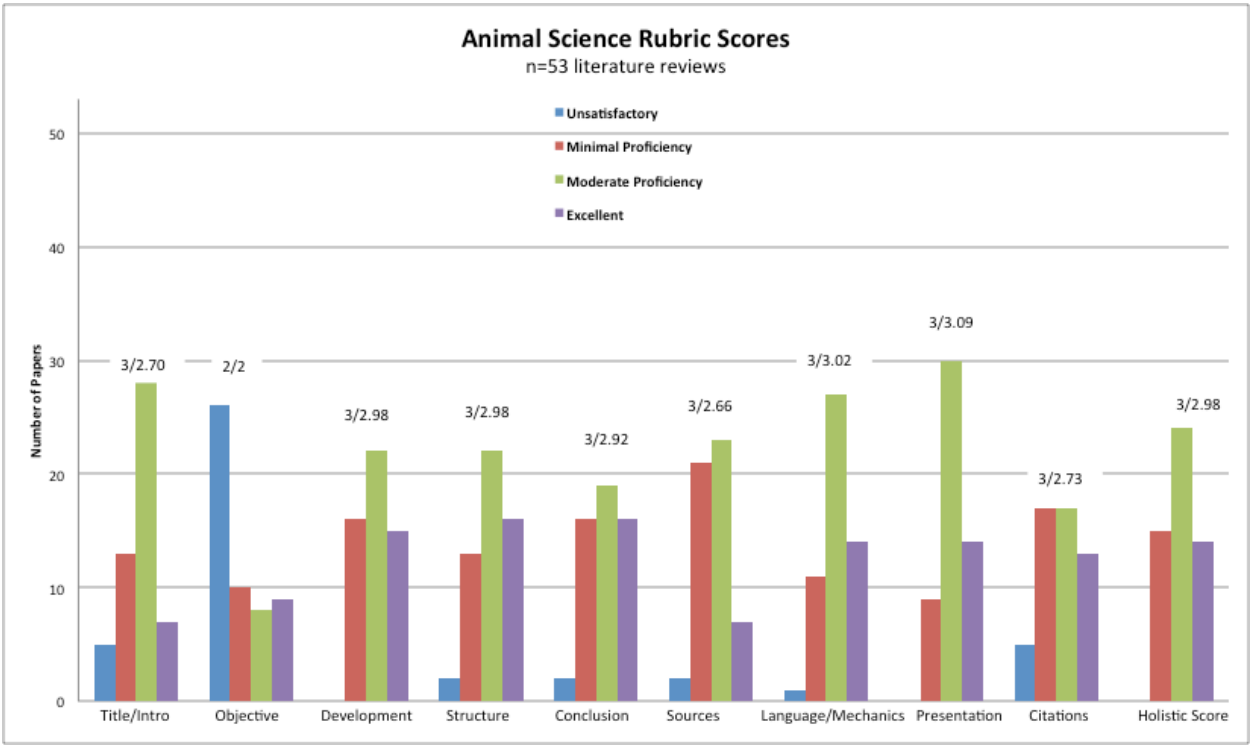
Outcomes were quite good, affirming that these W sections are working well and that the pedagogy should hold steady, albeit with two adjustments: coach more students toward sophisticated integration and synthesis of sources; and raise faculty awareness of problems with source use that were discovered through the deep-auditing/source-checking stage of assessment.

We collected all 53 of the final papers from 4 sections of the 1-credit 3000-level Ws offered in 2013-14. The Animal Science 1-credit Ws were among the earliest approved at UConn and have always been tightly integrated with a companion 3-credit course, with both taught by the same

professor. Although there is some variation in assignment expectations by section, all assign the same genre: a long literature requiring at least 10 sources. The assignment is designed to engage majors with published research. Students must find, summarize, and synthesize multiple sources to discover the research consensus on a topic of their own choice. The tight integration of the W with the companion 3-credit course, the use of core faculty to teach most sections, and cycles of faculty and peer review of drafts built in to the writing process combine to produce good student outcomes.

On 9 of 10 rubric items—including the holistic score—the mean and median scores for literature reviews evinced moderate proficiency for advanced undergraduate writing in the major. In this study, scorers set a fairly high bar for *moderate proficiency*. When students did the major elements of the assignment competently they were scored *minimal proficiency*; *moderate* and *excellent* were reserved for work that went beyond those basics. About 1/3 of the literature reviews were rated as excellent overall, which is a higher rate than we have found in other departments.

Each paper scored on a 4 point scale: (1) unsatisfactory; (2) minimal proficiency; (3) moderate proficiency; (4) excellent	Mean	Mean
TITLE/INRODUCTION: Title conveys subject and focus of the integrative literature review, and the introduction adequately introduces the issue and/or research question.	2.70	3
OBJECTIVE OF PAPER: Identifies and addresses topic directly; topic addressed is relevant for its readership and appropriate in scope.	2.00	2
DEVELOPMENT OF PAPER: Content coverage is adequate in depth and breadth of information On the objective/main topic.	2.98	3
STRUCTURE OF PAPER: Structure, sequencing and transitions are coherent, logical and appropriate to a literature review.	2.98	3
CONCLUSION: Conclusion connects main topic to overall points and gives a general consensus; discusses implications, if appropriate	2.94	3
USE OF SOURCES: Demonstrates critical analysis of relevant literature at level expected; synthesis goes beyond a simple summary of articles cited to develop a conceptual framework that links summaries and articles.	2.67	3
LANGUAGE: Displays a prose style, a tone, word/terminology/language choices, verb tenses, syntax, and other stylistic moves appropriate to academic writing in animal science at the undergraduate level.	3.02	3
PRESENTATION: Grammar, mechanics, spelling, punctuation, proofreading, and formatting.	3.09	3
CITATIONS: Appropriate, accurate and consistent use of references, citations, and bibliography in keeping with the style in the field.	2.73	3
HOLISTIC RATING: Assessment of the paper as work of animal science, both in its broadest sense and in the particular form engaged by the topic and genre.	2.98	3



As the rubric scores suggest, Animal Science majors demonstrated strengths in several higher-order concerns: development, structure and conclusions. This was affirmed in qualitative discussions, which also led to comments on other strengths: students selected fitting topics, and they drew on good peer-reviewed journal articles. Papers cited an average of 14 sources per paper, going beyond the required 10; the deep audit process also showed that students were using sources for a wide variety of purposes: offering context, supplying evidence, and introducing dissenting points of view.

Scores for sentence-level editing were high, which affirms one recommendation from earlier rounds of W assessment: most UConn students produce prose that is readily readable and appropriate for the intended audience; therefore, we should not devote any more class time than we do now to grammar or mechanics.

The lowest mean rubric item was "Objective of Paper," but this was probably the result of assignment variation across sections: only 1 of the 3 sections required that students include an explicit statement of objectives. This raises the question of whether the department should continue to include this item on its rubric. (That students scored fairly well on "Conclusions" suggests that they have a reasonable grasp on their objectives.)

A theme that emerged in discussion was the need for student writers to better integrate and synthesize their sources (even though "Use of Sources" scored between minimal and moderate proficiency). Many students moved from source to source, discussing each in turn, whereas the strongest reviews progressed topic by topic, with a cluster of sources discussed under each topic. This may take some modeling so that students who treat the literature like a dutiful checklist or series of summaries can see what real synthesis looks like.

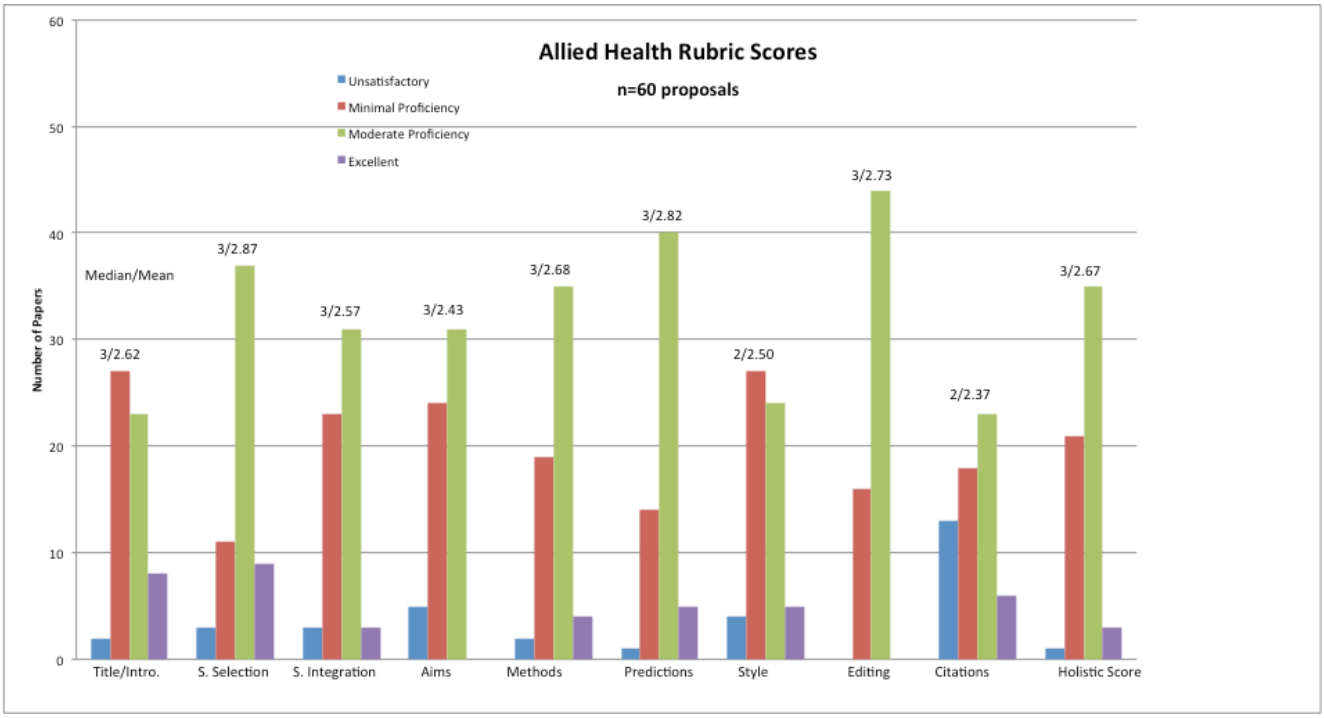
Deep Audits of 8 randomly selected literature reviews offered a more nuanced view of how students are using their sources—and revealed some systemic problems that were not visible during rubric scoring. Too many students are masking serious research, writing and ethical problems. 1 of the 8 papers was judged as committing gross plagiarism/intentional fraud: a student closely mimicked the content and conclusions of published meta-analysis but hid that fact, leaving the reader to think that he or she had actually reviewed the primary sources covered in the meta-analysis. While that was an exception, the norm was a pattern of lesser but still serious source attribution problems: 6 of the 7 remaining papers that faculty audited featured one or a combination of transgressions that could technically be defined as plagiarism but that were judged as unknowing, unintentional or careless source misuse (i.e., tracking too closely one or two sources without making that clear to readers, paraphrasing improperly, not attributing occasional paraphrases to the original author, making questionable omissions). To put this in a wider context, some recent studies of student writing at other universities suggest that this kind of "patchwriting" is more common than we have assumed (see *The Citation Project*). Still, these patterns merit attention, and they cannot be addressed with one-shot solutions such as plagiarism software such as SafeAssign. More comprehensive responses might include sending a "quality over quantity" message by adapting the assignment to require fewer sources, by including more explicit instruction on source use in the course, and/or by requiring students to explicitly articulate and reflect on their research and writing methods. Dialogue among faculty in the department—and across departments because we saw much the same pattern in Nutritional Sciences—might yield other solutions.

Allied Health

Allied Health W sections require students to undertake a particularly challenging writing task: compose a 15+ page research proposal that includes a literature review. Coordinated with a 2-credit lecture course on research, the 1-credit W sections are taught by graduate students who coach students through the literature review/proposal writing process, which involves a series of drafts and cycles of instructor feedback. As judged by their final submissions, students are performing well in meeting departmental writing expectations.

We collected all final papers from 2013-14 W sections and randomly selected 60 to include in this study. On 8 of 10 rubric items—including the holistic score—the median scores for literature reviews evinced *moderate proficiency* for advanced undergraduate writing in the major. In this study, scorers set a fairly high bar for *moderate proficiency*. When students did the major elements of the assignment competently, they were scored as achieving *minimal proficiency*; *moderate* and *excellent* were reserved for work that went beyond those basics. While Allied Health students scored well on nearly all rubric measures, very few papers were rated *excellent* overall, perhaps because while the assignment is designed to prepare students for research, most majors will not be going into graduate-level research.

Each paper scored on a 4 point scale: (1) unsatisfactory; (2) minimal proficiency; (3) moderate proficiency; (4) excellent	Mean	Median
TITLE/ABSTRACT/INRODUCTION: (a) All three of these sections are included and (b) clearly communicate the significance of the topic (i.e., why this topic is important/worthy of further research). (c) Logically prepares the reader for the specific topic being proposed.	2.62	3
LIT REVIEW/SOURCE SELECTION: (a) Identify and include at least 5 recent (past 5 years) primary peer-reviewed research articles (no review articles or secondary sources) that are (b) directly relevant to the topic. (c) Summarize them appropriately	2.87	3
LIT REVIEW/SOURCE INTEGRATION: a) Compares/contrasts studies with each other in an integrated manner that (b) clearly leads to/forms the basis for the proposed study.	2.57	3
SPECIFIC AIMS: a) Includes specific aims of the proposed study (or i.e., 'Objectives') that are (b) clearly stated, (c) logically stem from the literature review, (d) can be measured, and (e) are clearly linked with research hypotheses.	2.43	3
METHODS & PROCEDURE: a) Research Design, participants, instruments, and data analysis subsections are included, (b) are all compatible with the each other (e.g., correlational design > correlational analyses, etc., (c) will support the Specific Aims, and (a) is provided in sufficient detail to allow replication of the proposed study.	2.68	3
PREDICTIONS/DISCUSSION: (a) Predictions/expectations logically stem from Specific Aims, (b) are compatible with Methods/Procedures (e.g., inferential analyses > inferential conclusions), (c) adequately considers/addresses the strengths and limitations of the proposed study, and (d) comments on future directions/applications relevant to the proposed research.	2.82	3
STYLE: Appropriate nomenclature, syntax, formality, and technical style; helpful transitions; third-person perspective; mostly active voice; concise.	2.5	2
EDITING/MECHANICS: Grammar usage, sentence structure, punctuation, and spelling are consistent with departmental standards.	2.73	3
CITATIONS: Accurate and consistent use of references; appropriate use of in-text citations; and bibliography in keeping with departmental guidelines (all APA format).	2.37	2
HOLISTIC RATING: Overall sense of writing quality based on expectations for seniors in Allied Health.	2.67	3



Rubric scoring revealed that students were strongest in selecting sources (relevant, recent peer-reviewed articles), in composing "Predictions/Discussion," and in doing sentence-level editing. Through qualitative discussions we noted other patterns of strength as well: students understood the assignment well and dutifully adhered to the expected format (following the samples provided to them); most used more than the required 5 sources and many papers ran longer than 20 pages, which showed student investment (although papers with more sources and more pages were generally not better in quality than the shorter ones); most attempted some critique of the literature; and most attempted to integrate/synthesize their sources, using topic subheadings to prompt comparisons of 2-3 articles.

"Style" among the minimally proficient subskills, indicating that too many students came across as too loose and opinion-like in their prose. This does not mean that instructors should focus more on grammar or mechanics—on editing for correctness students scored fine, as moderately proficient—but instead that TAs might devote a lesson or two to teaching novice writers to adopt an appropriate scientific voice. "Citations" was the lowest mean among rubric items, but this should not be interpreted as students not realizing the *need* to cite their sources—the Allied Health readers/scorers thought that they did. Instead, that 2.0 median signals that many students did not strictly follow APA documentation conventions.

Deep audits of a subset of 8 papers revealed that most students read journal articles all the way through and used them purposefully. Although there were a few cases of improper paraphrasing and absences or misplacements of appropriate in-text citations, there were no cases of gross/intentional plagiarism. On the whole, Allied Health students were found to use sources more effectively and ethically than majors in other departments assigning literature reviews that we studied. This suggests not only that instructors were careful to teach students sound research and writing practices but also that it was probably wise to have the assignment require 5 sources/articles (as compared to 10 required in other 1-credit Ws).

The main shortfall, which was captured in discussions rather than by the rubric scoring, was that students often did not link their literature reviews to their proposals closely enough—that is, they often did not draw on the articles from the literature review when formulating the objectives for the study design. They need to better understand how one aspect of the paper feeds the others and create a consistent thread that runs through the whole paper. This may be a symptom of how the assignment is taught section by section, and might be addressed by directing students to do their final round of revisions with the need for a consistent thread in mind.

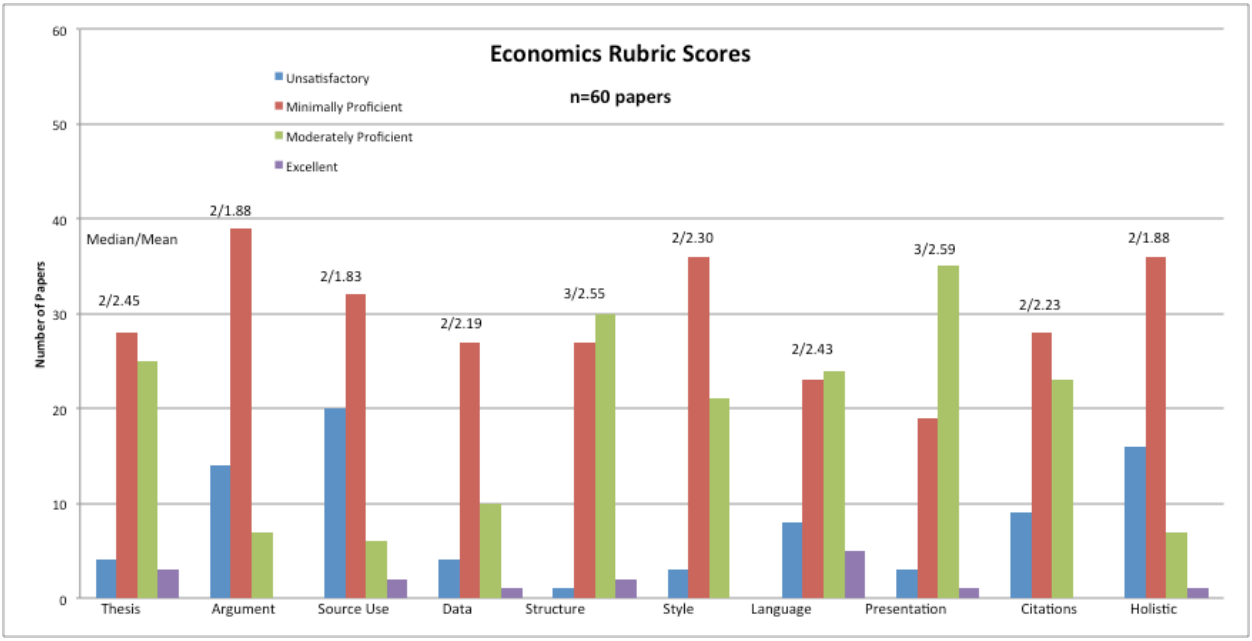
Beyond adjusting teaching practices in light of the strengths and weaknesses articulated above, the faculty/doctoral student team from Allied Health saw great value in the reading/calibration process we used to align scorer expectations and improve reliability, and they intend, starting in fall 2014, to have all TAs for their W sections score and discuss several practice papers together at the start of the semester.

Economics

Economics changed its W curriculum more recently than the other departments involved in this study, offering its first 1-credit Ws (ECON 2500W) in 2012-13. The course differs from the others in two other significant ways: (1) it is not attached to a companion 2- or 3-credit lecture course, and one consequence of its stand-alone one-credit status is that some students take it less seriously; and (2) the core assignment is a thesis-driven paper rather than a literature review. Students select a topic of interest, engage in research, and craft an argument grounded in sources. A professor from the department coordinates the course and oversees a cohort of graduate students who teach most of the sections and coach students through the drafting and revising process.

We collected all final papers from 2013-14 sections and randomly selected 60 to include in this study. The median for most rubric items was 2, or *minimally proficient* for advanced undergraduates in the major.

Each paper scored on a 4 point scale: (1) unsatisfactory; (2) minimal proficiency; (3) moderate proficiency; (4) excellent	Mean	Median
CLEAR THESIS: Identifies and addresses a clear central thesis, expressed early in the paper, either directly in a topic paragraph or indirectly through an appropriate rhetorical device (like an anecdote). Argument clearly expressed and sustained throughout paper.	2.45	2
DEPTH OF ARGUMENT: Conceptual sophistication and engagement with topic; recognition of limitations and counterarguments; thoughtfulness; originality of ideas; appropriate number of pages. Explicit use of economic theories, models, and data. Body of paper supports central thesis; brings to bear appropriate and persuasive evidence.	1.89	2
USE OF SCHOLARLY SOURCES: Marshals sources that are scholarly and reliable by the standards of the Economics profession (like journals, working papers, scholarly books, government and NGO websites); sources are adequate in number and appropriate for the paper's argument.	1.83	2
DATA: Where appropriate, presentation and analysis of data (including econometric results) in conformance with the style and norms of writing in Economics. Tables and graphs used effectively, plus clearly labeled and attributed.	2.20	2
STRUCTURE OF PAPER: Presentation is well organized: clear topic sentences; good transition between ideas; all sections of paper tie together.	2.55	3
STYLE: Style is direct, concise, and lively; avoids excessive and unexplained jargon and acronyms; refrains from clichés and bureaucratic formulations.	2.30	2
LANGUAGE: Awareness of audience. Tone, word/terminology/language choices, and other stylistic elements appropriate to professional economics, whether for journal publication or op-ed.	2.43	2
PRESENTATION: Grammar, mechanics (crisp pronoun and clause references; correct parallel structure), diction, spelling, punctuation, proofreading, and formatting.	2.59	3
CITATIONS: Appropriate, accurate, and consistent in-text citations and list of works cited. Command of name-date style of citation used in Economics.	2.23	2
HOLISTIC RATING: Assessment of the paper as a whole and its fit with the rhetoric of discourse in Economics.	1.88	2



Students scored well on "Structure" and "Presentation," which were points of emphasis in the course. The relatively strong showing on structure is encouraging because students were not given a format to follow; instead each had to decide on a structure appropriate to his or her argument. The relatively high scores for "Presentation" are consistent with findings from earlier rounds of W assessment that show UConn students generally more proficient in mechanics than in higher order concerns such as argument and analysis. As noted in earlier assessment reports, this finding suggests that instructors would be wise to emphasize higher order concerns in their teaching rather than devote more time to sentence-level editing.

Economics majors also proved relatively strong in selecting a topic, articulating a clear thesis, and setting the context for that thesis. Proficiency fell off, however, when it came to developing, supporting, and sustaining and developing that thesis. Indeed, the lowest rubric scores were in "Depth of Argument" and "Use of Sources," which both were good predictors of the holistic score.

As for "Depth of Argument," most students showed *minimal proficiency* in sustaining an extended, research-driven thesis, with a quarter of papers rated as *unsatisfactory* in this area. An important contributing issue was identified through qualitative discussions: when students argued for or against a particular public policy, too many did not ground their analyses in *economic* theories. The original expectation for the 1-credit W course was that students would transfer what they had learned in other economics courses to their W papers, but that generally did not happen. Most students did not seem to perceive this course as an extension of earlier courses (this is similar to what, in the 2010 round of W assessment, Mechanical Engineering discovered when their students wrote up senior design projects, and is consistent with what much research on transfer across courses in higher education has found). In future iterations of the W course, instructors might coach students more explicitly on how to bring specific theories learned in other economics courses to bear on their arguments; the assignment could even require that one

subsection of the paper name and discuss which particular economic theory or theories will serve as the foundation for the paper's argument.

Where students seemed to use sources best was at the front end of the paper to set up the background for the thesis, but overall source use was a relative weakness, and one third of the cohort scored *unsatisfactory* in this area. The low score on this subskill were due both to the kinds of sources students selected and to how they brought them to bear on their arguments. While students in the other three 1-credit W departments relied almost exclusively on peer reviewed journal articles, economics majors drew more popular press sources, as well as on journal articles outside economics (healthcare, human rights, political science). This habit contributed to the phenomenon discussed in the "Depth of Argument" paragraph above: too often the sources, while trafficking in economic issues, where outside the mainstream of the discipline. A related issue was that students often failed to consider the essential economic thinkers on their respective topics. These patterns in source use were largely confirmed when doctoral students source-checked seven randomly selected papers. Of those, one was found to select, comprehend and deploy sources excellently and one showed evidence of serious plagiarism, but the other five hovered in between those extremes, hovering around minimal proficiency in source use.

There are several potential curricular revisions that might improve how students select, read, and apply sources in their arguments:

- instructors could devote more class time to coaching students through how to find, select, integrate, and paraphrase sources
- instructors could limit the number of topics (rather than encourage every student pick a different topic) and devote some class time to collectively vetting sources specific to those fewer topics
- the assignment could require fewer than 10 sources, putting an emphasis on quality over quantity (this seemed to work for Allied Health)
- students could be to required or encouraged to use at least some sources (including textbooks) that they have already encountered in their other economics courses
- students could be encouraged to use review articles in economics to catch them up on the key background issues, positions and scholars on a given topic/question/debate.

Given that this 1-credit W course has been offered for just two years (led by different professors in fall and spring), the department had already been contemplating changes. For fall 2014, for example, the instructor is abandoning the large lecture section in favor of online material and breaking the TA-led sections into smaller groupings of 6 or 7, where students will present their topic proposals, lists of works cited, and first drafts. The findings from this study should assist the department in refining such curricular and pedagogical reforms.

Nutritional Sciences

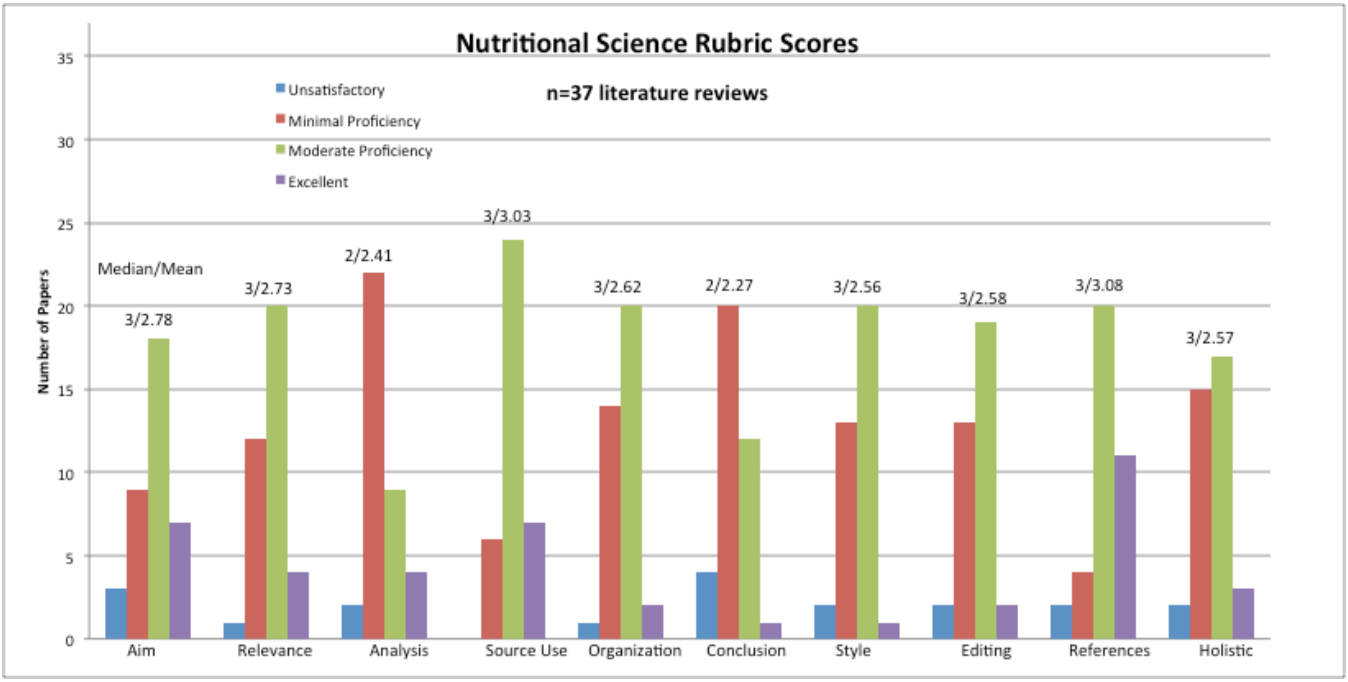
Outcomes were fairly good, suggesting that W sections are working well and that the curriculum and pedagogy should generally hold steady, although we did discover several activities on which students are struggling and to which faculty could devote more attention: interpreting primary

sources more critically; deploying sources more ethically; engaging in more sophisticated synthesis; and articulating conclusions and implications.

We collected 37 final papers from 3 sections of 3000-level Ws offered in 2013-14. When Nutritional Sciences moved to a 1-credit W requirement, it followed the model of Animal Science: offer a 1-credit W that is tightly integrated with a companion 3-credit course. All sections assign the same genre—a literature review on a topic of the student's choice (but within the scope of the course content) that requires at least 10 sources. Students must find, summarize, and synthesize multiple sources to discover the research consensus on their topic. The assignment engages majors with published research in ways that would prepare them for graduate study or professional life, and the department sees the W and its companion course as a capstone experience.

On 8 of 10 rubric items—including the holistic score—median scores for literature reviews evinced moderate proficiency for advanced undergraduate writing in the major. The subskill scores suggest that students are doing fairly well across the board.

Each paper scored on a 4 point scale: (1) unsatisfactory; (2) minimal proficiency; (3) moderate proficiency; (4) excellent	Mean	Median
AIM OF THE PAPER: The central purpose, claim, questions, or specific *aim of paper is clearly identified* and readily apparent to the reader; the title is apt and the introduction provides a brief background that leads up to the central purpose, claim, or questions.	2.78	3
CONTENT RELEVANCE/INTEGRATION: Content is *relevant* to the purpose, claim, research question, or specific aim of paper. Introduction, summary/discussion and conclusion show a *strong integration* with central purpose, claim, question, or specific aim of paper.	2.73	3
QUALITY OF ANALYSIS: Introduction, summary/discussion and conclusion show *thoughtful, in-depth analysis* of nutritional sciences concepts.	2.41	2
USE OF SOURCES: *Supported by* a wide variety of *valid research sources* from peer-reviewed professional journals or other fitting sources (government documents, agencies, manuals, etc.).	3.03	3
ORGANIZATION/LINE OF REASONING: Organization of the *paper clearly supports the purpose*, claim, questions, or specific aim of paper. The sections and paragraphs provide a *logical structure* and they flow smoothly from one to another and are clearly linked to each other; line of reasoning easily followed.	2.62	3
CONCLUSIONS & IMPLICATIONS: The central purpose, claim, questions, or specific *aim of paper was achieved and implications* for the nutritional research field were stated.	2.27	2
STYLE: Appropriate for an academic nutritional sciences research paper (*professional*); clear, concise, and effective choice of words and phrases; avoids colloquialism	2.56	3
EDITING: *Grammar* usage, sentence structure, spelling, and *punctuation* are consistent with standard professional usage.	2.58	3
REFERENCES: References cited in appropriate *professional format* in the text as well as reference pages.	3.08	3
HOLISTIC RATING: Assessment of paper as *work of nutritional sciences*, both in its broadest sense and in the particular form engaged by the topic and genre (i.e.- an example of a paper that represents the nutritional sciences field).	2.57	3



Students performed particularly well in "Use of Sources" and "References." This was affirmed in our broader discussion of the papers, which singled out students for performing up to or beyond expectations in identifying relevant topics, using appropriate databases, selecting good sources (13 per paper, on average), reading their sources all the way through (not just relying on the abstract), using sources purposefully, and articulating the aim of the paper.

The high mean for "References" affirms that students documented their sources according to disciplinary conventions. However, when doctoral students conducted extensive deep audits on 8 randomly selected papers, the impressive rubric scores on Use of Sources turned out to mask some problems. Of the 8 papers source-checked, 2 included occasions of gross plagiarism and 5 featured one or a combination of transgressions that could technically be defined as plagiarism but that were judged as unknowing, unintentional or careless source misuse (most common for Nutritional Sciences was copying relatively short passages from articles without attribution). After performing the deep audits, doctoral students scored 2 of 8 papers as "poor" in source use; however, these same papers scored "moderately proficient" on source use during the initial rubric scoring. As one scorer reflected, "Some of the papers that were most impressive on the surface turned out to be using sources badly, and some of the papers that not polished on writing turned out to be using sources most honestly." Nutritional Sciences majors are performing well in finding and selecting appropriate sources; they also seem to know the basic purpose and expectations for the literature review genre. But when we look more closely at how they translate their sources into a review, we see them falling short of intellectual and ethical expectations for advanced undergraduates. Underneath their relatively refined prose too many are fudging sources in ways that could get them into trouble in graduate studies or professional life. One curricular response could be to send a "quality over quantity" message by adapting the assignment to require fewer sources, allowing faculty more time to teach students how to use sources more

responsibly. Dialogue among faculty in the department might yield other solutions —so too might dialogue across departments because in Animal Science the same dynamic was evident.

The lowest rubric items—although both still crossed the threshold of *minimal proficiency*—were "Quality of Analysis" and "Conclusions and Implications." The "Quality of Analysis" issues were of two main kinds: students not fully comprehending individual research articles (even though they seem to be finding good sources, reading them through, and documenting them correctly); and students not synthesizing studies to articulate the body of evidence or consensus on a given topic. Some scorers suggested that to address reading comprehension, the whole class might read one article together and interpret it (this might need to be done in the 3-credit companion course). As discussed above in the Animal Science section, one practical way to steer students away from moving from source to source, discussing each in turn, would be to teach them to progress instead from subtopic to subtopic, with a cluster of sources discussed under each subtopic heading. This may take some modeling so that students who treat the literature like a dutiful checklist or series of summaries can see what real synthesis looks like. Given the relative deficit in synthesis, many students were not prepared to articulate conclusions or implications. Conclusions/implications had not only the lowest mean score but also the largest number of students who scored "unsatisfactory." This suggests that instructors should do more modeling of how to synthesize research, state conclusions with confidence, and articulate implications.

Four more areas for improvement (albeit less pressing ones) emerged from our qualitative discussions: (1) students often used scientific terms—*prove, correlation, accuracy, validity*—wrongly or imprecisely; (2) most did not see the need to define key terms to establish scope and set consistency (for example, defining "obesity" when setting up the review on that topic); (3) they did not seem to understand the genre of the review article (as compared to the typical journal article); and (4) they did not have a clear sense of their audience. Some possible ways to address those:

- include direct instruction on the most commonly misused terms
- show how academics typically define their key terms early in a review or paper (perhaps even require a section for defining key terms)
- discuss the nature of review articles and set clear expectations for how they can or cannot be used, and
- have faculty explicitly state the intended audience for the review in their assignment sheets.

A 15-page literature review with 10+ sources is a challenging assignment, particularly for a 1-credit course. Although our study revealed several areas of concern, students are achieving moderate proficiency in most areas.