“Fifty Questions”: Encouraging Students to Ask Questions and Evaluate Information

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Abstract

Two common learning goals in general education science classes are (1) students are able to formulate carefully considered, evidence-based conclusions and (2) students are able to locate and critically evaluate relevant information. To support students in these outcomes, “50 Questions” was created. This multi-step assignment required students to generate many questions, refine one question to investigate, and to gather and evaluate relevant information. The assignment was used in several terms of “AG 101: Agriculture in the Modern World.” This article provides the assignment and gives suggestions for improving the assignment for instructors who wish to adopt it. Based on quantitative and qualitative analysis, student work products clearly demonstrated that students made progress from their freshman/sophomore years to their junior/senior years in locating high quality information and being able to evaluate its quality correctly. However, student work did not clearly demonstrate that students made progress in formulating sophisticated questions as they advanced as undergraduates; extra instruction may be needed to support students in this important aspect of formulating inquiries that can lead to robust conclusions. With this caveat in mind, we conclude that the 50 Questions assignment provided an effective entry into the first steps of the critical reading and writing process, supporting student learning while easing the grading burden.

Core Ideas

- Students need support in learning to productively question received information.
- Students make clear progress in the ability to find and evaluate information.
- Students do not clearly progress in the ability to formulate sophisticated questions.

Two common learning outcomes for general education (GE) classes are (1) students formulate carefully considered, evidence-based conclusions and (2) students locate and critically evaluate relevant information. The first step to deliberate, critical decision-making is to ask meaningful questions. Asking questions of a text is a practice of mature learners, not novice learners. In lower-division GE classes, students may be at a developmental stage in which information received from a perceived authority is not to be questioned (Perry, 1970), or the accepted method of teaching in the discipline itself may encourage a dualist perspective (Finstor, 1989). It takes time to learn to ask questions, especially questions to which there may be no clear answer. In addition, students at any level of development may be “performance” oriented, more concerned with getting answers right than with exploring and extending the boundaries of their knowledge (Dweck, 2000). As one professor reflected, “I think a lot of students are scared to death of intellectual effort and generating ideas. So for me, part of that important process is helping them feel safe and encouraging them in a number of ways to just take a risk” (Brockman et al., 2011). It is imperative that students do get to ask questions and learn to ask questions, for questioning is the entry to learning (Donham et al., 2009).

At California State Polytechnic University, Pomona (Cal Poly Pomona), AG 101: Agriculture in the Modern World is a GE course that fulfills a “history, economics, and social science” requirement and a first-year experience option that fulfills a “lifelong understanding and self-development” requirement. This assignment was developed based on teaching AG 101 for seven quarters from F2010 to W2013.

In the first two quarters that AG 101 was taught, the assignment that addressed critical thinking and information literacy goals asked students to take a stand on a question or issue and to support their stand with evidence following research into the issue. The results rarely indicated that students had thoughtfully considered their stance or had put much effort into finding and evaluating information. This assignment, in which students jumped straight to an opinion, was not developmentally appropriate because forming opinions based on carefully researched evidence is an extremely advanced cognitive activity. Human beings tend to form opinions quickly and unconsciously, seeking supportive rather than contrary evidence (Haidt, 2001), and it takes
This is a different kind of paper than you may have done before. You will not write out a full paper. Instead, you will identify questions that are important to you and consider the kind of evidence that would help you to answer those questions in a way that is satisfactory to you.

Reasons for this assignment
- To question material that looks authoritative, as a precursor to investigating an issue.
- To articulate your own views, beliefs, preconceptions, or thoughts.
- To assess the quality of evidence based on the characteristics of that evidence.

How to do this assignment
First, read [assigned substantial article, book chapter, or other material].

Part 1: 15 points.
Brainstorm a list of questions you have as you read — get to at least 50 questions (more is good). Number them. It’s fine if the same question keeps popping up in slightly different words, or if many of the questions seem rather trivial and only a few of them seem big or important. However, at least some of the questions should be very thoughtful; don’t be contented with asking “What is that?” questions or with asking “fake” big questions like “Why can’t we just grow more food?” Also, your questions should show that you’ve read and thought about the entire assignment even if one part of the reading catches your attention and you end up asking most of your questions about that part.

Part 2: 20 points.
1. Look over all your 50 questions. See if any questions are repetitive and can be put together into one big question. Next, pick out your FIVE TOP questions, the most important ones to you.
2. Write a paragraph for each of your five top questions about WHY that question is important to you. What values do you hold, beliefs do you have, interests do you have, etc., that make this question interesting or important to you?
3. Pick ONE question to focus on for part 3 of this paper. Pick the most important one to you. Please identify this question clearly in some way.

Part 3: 40 points.
1. See if you need to modify your top question. You may need to narrow or clarify it in order to do good research to answer it.
2. Search for information that will help you answer your top question. You need to find and completely cite at least TEN sources of information that address your question. At least five sources must be good, high quality sources based on sound evidence. Use library databases and other formal search engines as needed. The other five can be, but do not have to be, poor sources based on rumor, junk science, or political posturing, the kind of thing that pops up first in a Google search when you use imprecise search terms.
3. For EACH source you find and cite, write a paragraph explaining why this is a good source of evidence and why, or if it’s a bad source and why.
4. Write a paragraph describing which of your sources you find most compelling or believable, and why.
5. BONUS 5 points: Answer your own question thoroughly based on the evidence you find.

Common mistakes that people make on this assignment:
- Not doing all the parts, or leaving some of them incomplete.
- Not citing references fully — leaving off authors, dates, or URLs.
- Not following a search engine result all the way to the original paper — this means that you might evaluate a reference incorrectly because, for example, you’re looking at a summary when the full paper might be better. Or, you might be very critical of how completely wrong an article is...because you didn’t follow it back to the original source and find that the paper was published in 1990, not 2012. Worst of all, you cite a high school paper as authoritative.
- Evaluating a source based on how useful it is for YOU, not on how sound the information is. If an article is not relevant to your question, don’t cite it! Find a different reference. If an article is exactly what you needed but the information is faulty, cite it, but critique it.
- Mistaking excellent writing style for substantive information.

Grading
Part 1: 15 points total, 1 bonus possible
2 points — At least 50 questions are present:
___ Yes, +2 ___ No, +0
3 points — There are enough questions from each part of the reading to indicate that you carefully read each part, even if you wrote more questions for a part that was really interesting to you
___ Yes, +3 ___ No, +0 to +2
10 points — At least 10 of the questions are thoughtful, that is: They are more than simple “What” questions, like “Who was Thomas Malthus?” They are not answered right within the text you’re reading, like “Why did Thomas Malthus say that humanity is doomed?” They are more specific than fake big questions like “Why can’t we just grow more food?”
___ Quite a few of your questions are thoughtful, +10
___ At least 10 of the questions are thoughtful, +7
___ Fewer than 10 questions are thoughtful, +1 to +6
___ Most or all of your questions are thoughtful, +1 extra

Part 2: 20 points total, 1 bonus possible
2 points — Five questions are identified as being important or interesting ones.
___ Yes, +2 ___ No, +0
2 points — You have clearly identified the question that you will focus on for Part 3.
___ Yes, +2 ___ No, +0
6 points — You have written a paragraph for each question, explaining why it’s important or interesting to you.
___ Yes, +6 ___ No, +0 to +5, depending how many you skip
10 points — Your explanations are clear, detailed, and thoughtful, carefully communicating your values and interests. Your writing is high-quality and articulate, with few to no grammatical errors.
___ +10
___ +8 or 9
___ +5 to +7
___ +4 or less
___ You did a really fantastic job, +1 extra

Fig. 1. Fifty questions assignment and rubric (continued).
extraordinary mental effort to resist. In fact, the original assignment probably set students’ learning back by allowing them to skip the steps of critical thinking and go straight to assertion.

Based on this result, it was conjectured that a carefully structured assignment that led students to formulate many questions and then refine their questions might open students to the possibilities of questioning texts and exploring limits. This was the basis of the 50 Questions assignment, which led students through a process similar to the Question Formulation Technique developed by Rothstein and Santana (2011). The assignment focuses on three skills that scaffold students’ ability to progress in the larger GE outcomes: (1) formulate a researchable question, a necessary prerequisite to careful consideration of an issue; (2) find information relevant to the question; and (3) distinguish between high- and low-quality relevant information. In addition to supporting these learning outcomes, the assignment needed to be reasonably enjoyable for students, and needed to be easy to grade. This article describes the resulting 50 Questions assignment, discusses demonstrated student learning outcomes, and provides suggestions for improving the assignment if other instructors wish to adopt it.

**METHODS**

The 50 Questions Assignment and Class Background

The 50 Questions assignment required students to complete seven steps: (1) read a substantial article or book chapter; (2) brainstorm a minimum of 50 Questions that occurred to them as they read; (3) identify the five questions that seemed most important or interesting to them and explain why each question was interesting; (4) identify and refine their very top one question; (5) locate and properly cite 10 sources of information that addresses this question, five of which are required to be high-quality sources; (6) evaluate each source for quality of information; and (7) for extra credit, actually answer their own question. The complete assignment prompt and grading rubric appear in Fig. 1.

The assignment was used with different readings in fall 2011 (F2011), winter 2012 Honors (W2012H), spring 2012 (S2012), fall 2012 (F2012), and winter 2013 Honors (W2013H). The following support activities occurred in all terms: in-class discussion of the overall assignment; clarification of the intent and related assignment outcomes to Cal Poly Pomona GE outcomes; in-class discussion of different levels of questioning, from simple, factual questions...
to complex issues that include multiple data streams and aspects of moral reasoning; in-class work with peers to refine question lists for Part 2, and to refine the final question for Part 3; view library tutorials (out-of-class) to locate and evaluate information; in-class discussion of the difference between relevant information and high-quality information; in-class work with peers to get feedback on source quality and source evaluation; and individualized instructor feedback on questions for Part 2, and on sources for Part 3 (see Fig. 1 for the entire assignment).

Table 1 presents an overall picture of the student population for quarters in which this assignment was used. Although the class is introductory, many advanced students participated for GE credit. Institutional Review Board approval was obtained in S2012. Only those papers from S2012, F2012, and W2013H whose authors gave permission were used for this analysis.

### Assessment of Students' Questions

Our central question in analyzing the students' work was whether more advanced students tended to ask more sophisticated questions and have better information literacy skills than less advanced students, based on Arum and Roksa's (2011) challenge that college overall does not help students advance in such skills. We identified a stratified random sample of the papers from each of S2012, F2012, and W2013H quarters. Stratification occurred on student level (freshman/sophomore and junior/senior); i.e., if, for example, 40% of the students in the class were juniors or seniors, our total sample included 40% of its papers from juniors and seniors, and included 60% of its papers from freshmen and sophomores. The total sample size was at least 20% of the papers from each quarter.

### Table 1. Demographics of student population in AG 101, Agriculture and the Modern World.

<table>
<thead>
<tr>
<th>Quarter†</th>
<th>Total students</th>
<th>Junior/ senior</th>
<th>Freshman/ sophomore</th>
<th>Agriculture‡</th>
<th>STEM§</th>
<th>Non-STEM/ non-ag¶</th>
</tr>
</thead>
<tbody>
<tr>
<td>F2011</td>
<td>44</td>
<td>29</td>
<td>15</td>
<td>27</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>W2012H</td>
<td>14</td>
<td>7</td>
<td>7</td>
<td>1</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>S2012</td>
<td>48</td>
<td>24</td>
<td>24</td>
<td>31</td>
<td>5</td>
<td>12</td>
</tr>
<tr>
<td>F2012</td>
<td>53</td>
<td>30</td>
<td>23</td>
<td>39</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>W2013H</td>
<td>12</td>
<td>4</td>
<td>8</td>
<td>7</td>
<td>5</td>
<td>0</td>
</tr>
</tbody>
</table>

‡ Agriculture majors included animal and veterinary science, plant science, ag education, general ag science, and apparel merchandising and management.
§ STEM (science, technology, engineering, math) included majors from engineering, biology, chemistry, physics, computer science, etc.
¶ Non-STEM, non-agriculture majors included majors from humanities, social science, business, hospitality, etc.

### Table 2. Sample questions and assigned codes.

<table>
<thead>
<tr>
<th>System code</th>
<th>Question</th>
<th>Quarter†</th>
</tr>
</thead>
<tbody>
<tr>
<td>One-system</td>
<td>What are fungicides? Why are they important to crops?</td>
<td>S2012</td>
</tr>
<tr>
<td></td>
<td>How can we use the process of no-till if weeds exist?</td>
<td>F2012</td>
</tr>
<tr>
<td></td>
<td>How does tetracycline help baby chickens grow?</td>
<td>W2013H</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No-system</td>
<td>Should countries abandon biofuel requirements?</td>
<td>S2012</td>
</tr>
<tr>
<td></td>
<td>Should richer countries share food with poorer countries?</td>
<td>F2012</td>
</tr>
<tr>
<td></td>
<td>How would you interpret the word &quot;modern food&quot;?</td>
<td>W2013H</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multi-system</td>
<td>Why aren't farmers all over switching to more water friendly/conservative irrigation systems that are more efficient?</td>
<td>S2012</td>
</tr>
<tr>
<td></td>
<td>What will &quot;scraping&quot; every biofuel target do to the population?</td>
<td>F2012</td>
</tr>
<tr>
<td></td>
<td>Why were farmers rich in past years, and now are barely making enough money to have a business even though our well being is in their hands?</td>
<td>W2013H</td>
</tr>
</tbody>
</table>

† S2012, spring 2012; F2012, fall 2012; W2013H, winter 2013 Honors.
Evaluation of Source Quality

For Part 3 of the assignment, we coded each reference given in each sample paper as high, medium, or low quality. High quality sources included research-based literature reviews, peer-reviewed articles, textbooks, government reports, non-partisan institution reports, dissertations, theses, and other similar types of reputable sources from a reputable publisher. Mid-quality sources included secondary or tertiary sources such as magazine articles and popular books from reputable publishers, as well as government and university media or web sources. Low quality sources were from questionable publishers, opinion pieces or material from slanted sources, or blogs and websites directed toward a lay audience (e.g., "wikihow").

The students’ evaluation of each reference was further coded as robust, non-robust, or incorrect. The robust code was applied if the evaluation of the source was correct and also recognized at least one characteristic quality of a good or bad reference. The non-robust code was applied if the evaluation of the source was correct, but reasoning was missing or wrong. The incorrect code was applied if the evaluation of the source was wrong, or the source was not evaluated. We counted the occurrences of each evaluation and noted the reasons that students gave for incorrect evaluations.

Chi-square analysis was performed, treating individual questions as the unit of analysis, although technically multiple observations from an individual student are not independent.

Survey of Students in Fall 2012

In F2012, an in-class, anonymous survey was conducted to get students’ feedback on the assignment. The survey included a numberless opinion line with tick marks, Likert-scale items, and open-ended questions. To obtain scores for the responses to the opinion line, the numberless line was subdivided between 1 and 4 and interpolated to the nearest 0.25. We could distinguish mark location to a degree of 0.25 (e.g., we could distinguish between 3.5 and 3.75). Summary statistics are provided, using only those surveys for which students gave permission.

RESULTS

The frequency of one-, no-, and multi-system questions for the 50 Questions assignment was evaluated for lower- and upper-division students (Table 3). Overall, most questions were one-system, or questions that can be definitively answered with factual information from within a single viewpoint.

The types of questions asked by freshmen/seniors and junior/seniors differed depending on the quarter. In S2012, there were no differences between lower- and upper-division students. In F2012, lower-division students asked fewer one-system questions and more no-system questions than upper-division students ($p < 0.01$). In W2013H, upper-division students asked fewer one-system questions and many more multi-system questions than lower-division students ($p < 0.005$).

Evaluation of Source Quality

We evaluated the tendency of lower- and upper-division students to locate high, medium, and low quality information sources (Table 4). Upper-division students were more likely to locate high-quality sources than lower-division students ($p < 0.005$ for all quarters). However, even lower-division students have reasonably good skills in locating high- to medium-quality sources, because less than 20% of their sources were identified as low-quality.

| Table 3. Frequency of one-system, no-system, and multi-system questions for lower-division (freshman/sophomore) and upper-division (junior/senior) students. |
|---|---|---|---|---|---|
| Quarter† | Total students in class | No. of students sampled by division | Usable questions | % One-system questions | % No-system questions | % Multi-system questions |
| S2012 | 48 | Lower: 6 | 300 | 87 | 8 | 5 |
| | | Upper: 9 | 440 | 82.5 | 9.5 | 8 |
| F2012 | 53 | Lower: 8**‡ | 382 | 75 | 13 | 12 |
| | | Upper: 8 | 382 | 81 | 8 | 11 |
| W2013H | 12 | Lower: 4**‡ | 203 | 87.6 | 8.1 | 4.3 |
| | | Upper: 2 | 107 | 71 | 9 | 20 |

*Significant at the 0.01 level.
† S2012, spring 2012; F2012, fall 2012; W2013H, winter 2013 Honors.
‡ For F2012 and W2013H, lower- vs upper-division students differed in their tendency to ask one-system, no-system, and multi-system questions. Comparisons were not made across quarters.

| Table 4. Tendency of lower-division (freshman/sophomore) and upper-division (junior/senior) students to locate high, low, and medium quality information sources. |
|---|---|---|---|---|
| Quarter† | Total students in class | No. of students sampled by division | Total sources provided in sample | % High quality sources | % Medium quality sources | % Low quality sources |
| S2012 | 48 | Lower: 6**‡ | 57 | 36 | 44 | 17 |
| | | Upper: 9 | 86 | 59 | 33 | 8 |
| F2012 | 53 | Lower: 8**‡ | 75 | 40 | 47 | 13 |
| | | Upper: 8 | 80 | 69 | 29 | 2 |
| W2013H | 12 | Lower: 4**‡ | 40 | 38 | 52 | 10 |
| | | Upper: 2 | 20 | 75 | 20 | 5 |

*Significant at the 0.05 level.
† S2012, spring 2012; F2012, fall 2012; W2013H, winter 2013 Honors.
‡ For S2012, F2012, and W2013H, lower- vs upper-division students differed in their tendency to locate high-, medium-, and low- quality sources. Comparisons were not made across quarters.
Table 5 presents an overview of the difference between lower- and upper-division students regarding their ability to evaluate the quality of a located source. Upper-division students are more likely to robustly evaluate a source's quality than lower-division students ($p < 0.05$ for F2012 and W2013H). For the S2012 quarter, the distressing number of "incorrect" evaluations for the junior/senior students was predominantly due to three papers (of nine sampled) in which almost every source was evaluated incorrectly.

When evaluations were coded "incorrect," it was most often because the student simply summarized the source's content rather than evaluating its informational quality. This error occurred a total of 77 times in the 353 sources that were coded, mostly due to 5 papers in which the mistake occurred for almost every source: 3 junior/senior papers in S2012 mentioned above, 1 freshman/sophomore paper in F2012, and 1 junior/senior paper in F2012. Students cited relevance or irrelevance of the reference as a stand-in for informational quality 48 times, e.g., "This was a very good article because it directly addressed my question/this was not a good article because it did not address my question." No Honors paper contained either of these errors. Students had been specifically instructed about both issues.

Infrequent reasons (<25) for the "incorrect" code included mistaking style for substance, e.g., "When numbers are used, I know that research was done" or "The writing was very good" (one freshman Honors student cited The Onion as a credible source due to the writing quality), mistaking presence in a library or database as reliability, e.g., "I found this article in the library database, so I know it's reliable," or relying on currency, number of subscribers, or non-profit status as stand-ins for credibility.

### Survey of Students in Fall 2012

Thirty-nine students gave permission for their survey answers to be used in this article. Table 6 presents the survey questions and simple summary statistics. The majority of students enjoyed the assignment, and a strong majority felt that it supported their learning at least as well as more traditional research paper assignments.

Thirty-five students provided elaborations on the answer to "Do you think your answer for the question [regarding the point of learning] would have been different before this class? Why or why not?" Twenty-four students reported "no," this class had not changed their notions of what learning was. Most of these students already felt that exploring ideas was more important, but three additionally mentioned that they had come to this conclusion during their college careers. Six students said that knowledge of information was the point of learning, and that this class had not changed that opinion. Eleven students reported that this class had impacted their understanding of what learning was. Seven of these mentioned the class’ emphasis on questioning and exploring. Others mentioned that the class helped to focus their questioning and that finding lots of informational resources was helpful.

In comments on answers to Likert-scale items, positive responses were the most common (7 of 14), describing perceived learning, such as stretching the student's imagination, learning to ask a better question, or learning to evaluate information quality without being biased by relevance. Sadly, a few comments bluntly stated that academic work is never enjoyable. Single comments indicated a reliance on grades to indicate success, a personal preference for a more traditional paper format, and a suggestion that answering the question selected as the single most important question should not be optional.

The most common comments (11 of 29) regarding improving the assignment focused on the number of questions. Most students suggested reducing the number of questions from 50 to 20 or 30. One person suggested raising the number to 100 questions, and another person suggested requiring fewer questions but that all questions must be thoughtful. A few students (6) suggested giving more guidance, such as helping students through the reading and guiding them in choosing a good question to research. Four students indicated the assignment was fine as it was, while individual comments addressed timing of the parts of the assignment and timing of feedback.

### DISCUSSION

It was not surprising that the overwhelming majority of the questions were "one-system," issues that could be addressed with relatively straightforward information. The material was unfamiliar to students, meaning that most of their initial cognitive energy went toward trying to fit the new information into existing mental categories (Svinicki, 2004), which often required needing more information about the information. Although the Honors section cannot be directly compared with the non-Honors sections due to having a more complex reading, it is interesting that the Honors section had slightly fewer one-system questions...
overall. The most intriguing result was that upper-division Honors students had a large increase of “multi-system” questions compared with their lower-division classmates, raising a question as to the cause of the difference.

One often-repeated piece of advice for writers is to separate the processes of idea generation from editing (see, e.g., Elbow, 1989). The 50 Questions assignment allows students to focus separately on generating ideas and selecting promising ideas for further consideration. By far the majority of students did indeed provide 50 Questions, and Honors students provided a few more than 50 each. It is important to have students generate the initial questions individually, in writing, by themselves. Brainstorming research has shown that group brainstorming is less effective in generating ideas than individual brainstorming (Stroebe and Diehl, 1994). Having students continue exploring by discussing the categories of questions, identifying interesting questions, and explaining to each other why they are interesting, takes advantage of group learning.

Thankfully, students do seem to progress in their information literacy skills through their education, although the question is open as to whether these skills transfer to non-academic settings, even for extremely experienced learners (Quinn and Leeligdon, 2014). Because no pre-post assessment was performed, we cannot claim that this assignment taught more advanced students to locate high-quality sources, but it is reassuring to know that they learned these skills at some time during their education. Lower-division students need extra instruction on source evaluation; being incorrect in more than 30% of their source evaluations is a problem.

It was not surprising that a common mistake in the students’ information source evaluation was that relevant sources were considered “good,” regardless of their other characteristics. Inexperienced students consider ease of use and content as their first two criteria for selecting information, and credibility is not considered; more experienced students regard content as the most important aspect of information quality, followed by credibility (Johnson et al., 2015). Clearly, deliberate instruction is needed to help students see that “relevance” is a necessary but far from sufficient condition for information to be of high quality.

The most common problem with students’ evaluation of sources was that some students did not “evaluate” sources—they summarized the content of those sources. This may be explained in terms of Bloom’s taxonomy of learning objectives, in which “understanding (summarizing)” is a necessary but lower-level step toward “evaluating” a situation (Bloom et al., 1956). Activities should be specifically designed to support students to move toward higher-order thinking (King et al., 1998). The classroom activities surrounding this assignment briefly addressed the difference between summarizing and evaluation, but more deliberate and extensive instruction might help reduce the “summarizing” error.

Arum and Roksa (2011) suggest that many students do not demonstrate an improvement in critical thinking and reasoning, or in writing, over their college years. They posit that professors may communicate low expectations and not require enough reading and writing (p. 93). There is good reason for professors not requiring enough reading and writing: students strongly resist these activities (Hoeft, 2012) and it takes considerable energy to prod them, and many professors generally feel uncomfortable with teaching writing (Bean, 2011). The 50 Questions assignment provides an entry into the first steps of the critical reading and writing process that supports students, while easing the grading and feedback burden on the professor.

Table 6. Results for F2012 student survey (n = 39).†

<table>
<thead>
<tr>
<th>Question</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I thought the 50 Questions assignment was enjoyable (as assignments go).</td>
<td>1</td>
<td>22</td>
<td>14</td>
<td>1</td>
</tr>
<tr>
<td>The exercise of brainstorming 50 Questions was useful in stretching my imagination.</td>
<td>9</td>
<td>27</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>I learned something new about what makes a “good” question during the 50 Questions assignment.</td>
<td>14</td>
<td>22</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>The 50 Questions assignment helped me to improve my information-finding skills at least as well as a traditional research paper.</td>
<td>12</td>
<td>25</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>The 50 Questions assignment helped me to improve my information-evaluating skills at least as well as a traditional research paper.</td>
<td>14</td>
<td>23</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Please feel free to comment on any of your answers above. (14 total comments received)

How should Dr. B. change this assignment for next quarter so that students can learn the most from the assignment? (29 total comments received)

† F2012, fall 2012.
The limitations of this study are apparent: first, because pre-post assessment was not performed, we cannot claim that this assignment substantially contributed to students’ questioning ability or information literacy skills, except on the basis of self-reports in the S2012 survey. The survey did indicate that most students felt it helped them learn at least as well as a traditional research paper, and that the majority of students felt that the assignment helped them learn about asking good questions. In addition, content coding of the questions and the information sources required the coders’ interpretation and judgment, which is a well-recognized problem in qualitative studies (Rose et al., 2015).

Suggestions for Improving Students’ Learning Experience

At the end of this process, we developed some suggestions for revising the 50 Questions assignment to more fully support the learning outcomes of critical thinking and information literacy.

1. Ensure that the base reading is provocative as well as rigorous. The “Nine Billion People” special report was less effective than the End of Food chapters or the Eaarth chapter because “Nine Billion People” was completely straightforward. It was excellent to introduce issues, but lent itself to low-level questioning.

2. Select the number of questions based on the instructor’s ability to generate questions from the reading assignment. If the instructor can readily generate high-level questions well beyond 50, asking the students for 50 is fine; if the instructor struggles to generate 50 good questions because the reading is too simple, change the reading or reduce the number of questions.

3. Use repeated class activities to discuss the different levels of questions to help students identify low- and high-level questions, and to lead students to reflect on the power of complex questions in discussing important issues. Helping students to ask better questions may require specific activities (Keeling et al., 2009).

4. Provide a checklist for students to use when evaluating their references. As an in-class activity prior to the Part 3 final due date, have students bring in at least two or three references and evaluations and check each other’s work against the checklist. Then, have students write down a plan of action to improve their references and evaluations after talking to their peers.

5. Ensure that there is time to allow students to revise Parts 2 and 3 of the assignment based on instructor feedback.

6. Provide short pre-post assessments, such as minimally graded quizzes, so both students and instructor can mark progress in each stage of the assignment with verifications independent of the assignment.

7. Provide short, in-class reflective assignments, prompting students to consider what skill each section of the 50 Questions assignment addresses and how they might transfer that skill to other situations.

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References

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