Improving students’ critical thinking skills through Internet technology: Just in Time Teaching in a history of photography course

Claude Cookman • Indiana University Bloomington • IS-SOTL Conference • Oct 23, 2004

Abstract

This paper presents research on my effort to help students in my History of Twentieth Century Photography course increase their critical thinking skills through a relatively new Internet method called Just in Time Teaching (JiTT). Taught during Spring 2004, the course enrolled 107 senior- and masters-level students who were predominantly photojournalism and fine arts photography majors.

The primary research question was: Would having students use the Internet to answer study questions on assigned readings increase their critical thinking? The syllabus gave critical thinking a two part definition: identifying an author’s thesis and argument to evaluate if her/his argument was convincing; second, mastering ten operationalized skills essential to practicing the history of photography such as observing, describing, comparing and contrasting, classifying, analyzing, interpreting.

Under JiTT, students responded electronically to questions posted on the course Website. After reading their responses before class, I adjusted my lecture and discussion questions based on their understanding or misconception of the readings. I used Bloom’s taxonomy to write questions intended to promote higher-level thinking. Early in the semester, I started questions at the level of comprehension but soon moved them to application, analysis, synthesis and evaluation. The textbook was an anthology of primary writings on photographic history.

A rich set of data resulted from questionnaires, focus groups, student self evaluation essays and a final-exam question. In the first three, students consistently reported that their critical thinking skills increased. On an exit questionnaire in response to the prompt “Did the [JiTT] assignments help you increase your critical thinking skills?” 81.97% said yes; 18.03%, no. For each operationalized skill, students were asked if it “greatly improved,” “improved,” “stayed the same” or “regressed.” Combined responses to “greatly improved” and “improved” ranged from 58.4% for “formulating a thesis” and “testing a thesis” to 95.4% for “observing”. Responses for all ten averaged 82.6%.

On an open-ended question, numerous students reported the JiTT assignments did help increase their critical thinking. Responses included: “I hated them at first, but soon realized that without them, I wouldn’t have bothered to think deeply about any of the readings.” “They forced me to be a more active, critical reader in this class and in others.” They “made me go beyond just skimming the readings, they made me retain and process the knowledge found in them.”

To gather data beyond self reporting, I asked a question on the final exam based on the skill of classifying. Students were shown photographs they had never seen and asked to “position the photographer ... within the history of twentieth century photography.” A content analysis is still ongoing, but grading the question revealed that a large majority of students successfully identified the genre, time frame and stylistic tradition.

This study found the JiTT method did increase critical thinking among a large majority of students. While more research is necessary, the author hypothesizes that JiTT strongly motivated students to engage in the course; its power resulted from their understanding that their responses would be processed during class discussions, in which they would have to explain and defend their ideas.
About the course

History of Twentieth Century Photography is a large-lecture survey course taught in alternate spring semesters. Cross listed in the schools of Journalism and Fine Arts at Indiana University’s Bloomington campus, it comprised four sections: for each school there was a 400-level section for undergraduates and a 500-level for graduate students. In the spring of 2004, the course enrolled 107 students. Most anticipated careers as art photographers or photojournalists; a few took the course for personal enrichment; a few were art history majors; one was a doctoral student in art history.

Course content. The course surveyed photography as a medium of art and communication from the Pictorialist movement, which extended from the 1890s until World War I, through the postmodern era, which began in the 1970s and continues to the present. We examined such art genres as portraiture, landscape, still life and the nude, and considered such communication categories as war photography, the social documentary tradition, the magazine picture story, fashion and advertising. We traced such movements and schools as Pictorialism, straight photography, surrealism and conceptual photography. We explored how developments in optical, chemical and mechanical technologies created new aesthetic possibilities. We situated photographers and their work within biographical, historical, economic and social contexts, and we considered the impact of postmodern theory on the understanding of the photograph, the photographic act and how photography functions in society. We did this, while examining the work of more than 125 major photographers.

Course objectives. I wanted my students to 1) acquire a broad knowledge of twentieth-century photography through readings, discussions, lectures and other active-learning experiences; 2) acquire a deep knowledge of a specific photographer, movement, issue or other aspect of twentieth-century photography through a research project; 3) develop the ability to articulate, orally and in writing, their intellectual, aesthetic and emotional responses to photographs; 4) develop the interest and the methodology to pursue the history of photography long after the course ends; 5) develop an historical consciousness.

In addition, the syllabus emphasized critical thinking as an overriding concern of the course:

In the tradition of liberal arts education, this course should make you a better thinker. We will emphasize critical thinking skills in my lectures, our discussions and your writing.

The syllabus offered a two-part definition of “critical thinking”:

Here is how I define critical thinking for this course: First, we will learn to read critically; that is, to identify an author’s thesis and arguments, and to evaluate whether those arguments convincingly support his or her conclusions. The larger objective is to apply similar critical analysis to your own writing in order to improve it.

Second, we will engage in several mental operations that are essential to studying a visual art and to practicing history. They include observing and describing, comparing and contrasting, summarizing, classifying, analyzing, synthesizing, interpreting, periodizing, sourcing, contextualizing, formulating a thesis, testing a thesis, and constructing concept maps.

Course methods. In art-history pedagogy students typically memorize, and are tested on, the names of the artists, titles and dates of works of art. Because I am more interested in fostering my students’ learning at Bloom’s higher cognitive levels — comprehension, application, analysis, synthesis and evaluation — I have rejected this emphasis on memorization. Instead of basing the semester
grade on examinations that require retention, I have made this a writing-intensive course. Eighty percent of the semester grade is based on writing assignments, only 20 percent on exams. Writing assignments include three short papers, a major research project and the JiTT questions. Even the exam component is writing-based, comprising essay questions.

**JiTT component.** Having students answer questions about reading assignments is a long-standing teaching method, as evidenced by the questions at the end of the chapters in most textbooks. In this course, the study questions were administered through a relatively recent application of internet technology called Just in Time Teaching. Gregor Novak and his colleagues in physics and other sciences developed JiTT at Indiana University Purdue University Indianapolis during the 1990s. Shortly before class, students respond electronically to questions about the day’s assigned readings, or about lab problems or other academic content. As the professor reads the students’ responses, she/he gains insights about their thinking, including misconceptions, which help shape the day’s lecture, discussion and other classroom activities. As Novak explains:

> We have built the JiTT system around Web-based preparatory assignments that are due a few hours before class. The students complete these assignments individually, at their own pace, and submit them electronically. In turn, we adjust and organize the classroom lessons in response to the student submissions “Just-in-Time.” Thus, a feedback loop between the classroom and the Web is established. Each lecture is preceded and informed by an assignment on the Web.

Instead of JiTT, I called my study questions “TARs”, an acronym for “Thinking about the Readings”. Students responded via IU’s Oncourse, an online course environment that facilitates Web-based teaching and learning. None of my questions was based on the retention of facts. By asking questions at the levels of Bloom’s higher cognitive skills, I used JiTT to advance my objectives of helping my students become better critical readers and to give them experiences in the mental operations. Early in the semester, comprehension questions predominated, as I asked students to summarize the readings in their own words. Questions of analysis included whether the argument supported the thesis. Synthesis questions asked students to compare the perspective of that day’s writer with ones from a previous reading. Frequently, I asked evaluation questions that required students to take and defend a position on an issue. Wherever possible I used oppositional readings with two or more writers taking contrary positions on an issue or topic.

It’s important to note that I used an anthology (Hulick), not a standard textbook. The readings included artists statements, catalog essays, criticism, academic history and postmodern theory. Most were written contemporaneously to their topics. The kind of critical thinking I am trying to foster would be difficult with a standard textbook. In addition to bloodless, homogenized writing, many textbooks lack the strong point of view that students need to pit their own thinking against.

Typically, I asked two or three open-ended essay questions for each reading. Examples of four questions and the kind of thinking they require follow:

1. Except Peterson, all the authors wrote during the period of Pictorialism. All were, more or less, sympathetic to Pictorialism’s major objective — to secure for photography the status of art. Drawing on at least three of the first five readings (you may, of course, use all five), synthesize the writers’ major arguments supporting the contention that photography is an art form.
This question required students to pull together statements from three to five readings, evaluate which arguments are most appropriate and synthesize them into their own summary.

2. A major concept in the history of photography is often expressed with the shorthand phrase: “technology drives the medium”. That is, the evolution of technical aspects of photography — developments in cameras, lenses, film speed, chemistry, reproduction — make new modes of photographic seeing and imagery possible. Hulick devotes a sizeable portion of her overview of the 1920-to-1940 period to this theme. From her account, identify two technological developments that you think were especially important. Explain them and then explain how they changed photographic seeing and imagery and/or photographic practices. Buttress your argument with photographic examples.

This question required students to analyze and evaluate a group of developments in order to choose the two they think are most important. They must show comprehension in explaining the developments in their own words, and they must practice synthesis in connecting these developments to changes in photographic imagery and in finding examples.

3. Hall identifies six elements in the humanist paradigm of the French photographers and ten themes which they frequently captured. Use as many of those elements and themes as applicable to analyze the photograph on the opposite page.

Students had to apply a complex set of new ideas to a photo they had not previously seen.

4. Part of becoming a critical reader is learning to read between the lines: to identify unstated assumptions; to uncover what is hidden; to identify what is left unsaid; to register the writer’s attitude, approach, sympathies; to intuit her or his unacknowledged purpose. Choose either Edey or Guimond. Reading between the lines, analyze the writer you chose using the above prompts. That is, identify and critique his assumptions, omissions, attitudes, sympathies, purposes. Then say whether or not you found your writer’s argument convincing. That is, did he achieve his purpose? Finally, explain why.

So many college students approach their textbooks armed with yellow highlighters, ready to mark what strikes them as important to remember or likely to be on the exam. Rarely are they encouraged to question the textbook’s authority. Critical reading — including bringing into consciousness what’s left unstated in order to challenge it — should be a primary thinking skill inculcated into our students.

**Student reaction to TARs**

Although many students complained about the amount of work the JiTT method required, most reacted positively. On an exit questionnaire, I asked several quantitative and open-ended questions about the TARs component. The quantitative questions included:

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
<th>n=61</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did the TARS assignments help you process the readings at a deeper level?</td>
<td>96.72%</td>
<td>3.28%</td>
<td></td>
</tr>
<tr>
<td>Did the TARS assignments help you increase your critical thinking skills?</td>
<td>81.97</td>
<td>18.03</td>
<td></td>
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</tbody>
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In response to questions about the mental operations, students predominantly checked greatly improved and improved. Combined percentages for these two options ranged from a high of 95.4 percent on observing to a low of 58.4% on both formulating and testing a thesis. These low scores reflect the fact that we did not spend significant class time working on those two skills.

<table>
<thead>
<tr>
<th>Skill Description</th>
<th>Greatly Improved</th>
<th>Improved</th>
<th>Stayed Same</th>
<th>Regressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>My skills at observing photographs … (n=65)</td>
<td>50.8%</td>
<td>44.6%</td>
<td>4.6%</td>
<td>0</td>
</tr>
<tr>
<td>My skills at describing photographs …</td>
<td>44.6</td>
<td>49.2</td>
<td>6.2</td>
<td>0</td>
</tr>
<tr>
<td>My skills at comparing and contrasting photographs …</td>
<td>46.1</td>
<td>46.1</td>
<td>7.8</td>
<td>0</td>
</tr>
<tr>
<td>My skills at summarizing bodies of photographs …</td>
<td>50.8</td>
<td>41.5</td>
<td>7.8</td>
<td>0</td>
</tr>
<tr>
<td>My skills at classifying photographs …</td>
<td>30.8</td>
<td>52.4</td>
<td>1.5</td>
<td>0</td>
</tr>
<tr>
<td>My skills at analyzing the form and content of photographs …</td>
<td>41.5</td>
<td>46.2</td>
<td>12.3</td>
<td>0</td>
</tr>
<tr>
<td>My skills at synthesizing large amounts of information …</td>
<td>27.7</td>
<td>49.2</td>
<td>23</td>
<td>0</td>
</tr>
<tr>
<td>My skills at forming my own interpretation of photographs …</td>
<td>41.5</td>
<td>44.62</td>
<td>13.8</td>
<td>0</td>
</tr>
<tr>
<td>My skills at formulating a thesis …</td>
<td>15.4</td>
<td>43</td>
<td>40</td>
<td>1</td>
</tr>
<tr>
<td>My skills at testing a thesis …</td>
<td>15.4</td>
<td>43</td>
<td>40</td>
<td>1</td>
</tr>
</tbody>
</table>

Asked to balance the work involved against the learning, 75 percent said the increased work was worth it.

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
<th>n=60</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did the learning you gained from the TARS assignments make them worth the work they required?</td>
<td>75.4</td>
<td>24.6</td>
<td></td>
</tr>
</tbody>
</table>

Responses to the open-ended question “Please say anything you would like about the TARS assignments” included:

I hated them at first, but soon realized that without them, I wouldn’t have bothered to think deeply about any of the readings.
Too often in class I read my assignment just to say I did it. The TARs gave me a reason to read the assignments. They forced me to be a more active, critical reader in this class and in others.

[They] made me go beyond just skimming the readings, they made me retain and process the knowledge found in them. They didn’t help, they forced. I had to dig into the text which is way more academic than I care to read. But, that’s a good thing.

These comments were consistent with responses to the same question from students who took the course in Spring 2002. Their comments included:

Writing forces you to learn in a way that is different from reading alone.

They were a lot of work, but I thought they were a great way to process the readings.

They prepared me for class. I felt like contributing more after answering the questions.

I have long been interested in the affective domain of learning, especially in students’ engagement in the course. I’m certain that a positive disposition toward learning and engagement in the course is essential for students to sustain the heavy workload of this writing-intensive course. Thus, in the same questionnaire, I asked about motivation: “Regarding your attitude toward learning in this course as compared with other courses you have taken at the 400/500 level, were you …” Responses on a standard five-step Leikert scale were:

A. much more motivated? 24.56% n = 57
B. more motivated? 50.88
C. motivated at the same level? 22.81
D. less motivated? 1.75
E. much less motivated?

Slightly more than 75% said they were much more or more motivated than in other courses. Almost 23% said they were motivated at the same level; only 1.75% said they were less motivated.

Seeking a correlation to the JiTT method, I asked the following open-ended question: “Please explain what caused your greater or lesser degree of motivation.” Student responses varied considerably. Many said their motivation stemmed from their interest in photography. For example, one student wrote, “My major is photojournalism so these subjects interest me & make me want to learn everything I can about it.”

Some students did credit TARs or other course work as motivating factors. Comments included:

The amount of home work — it kept me involved w/ the course so I did not get distracted and thus uninterested.

I knew in this class I wouldn’t be able to skip readings or blow off assignments.

The TARS were helpful in that they motivated me to do the reading as well.

I liked that the learning was at a personal level, meaning that most of the knowledge came from readings & exploration & research.
I was motivated more because I knew this class was aimed to help me improve my skills as a writer and critical thinker.

Conclusion

JiTT was one important component in helping my students to increase their critical reading and thinking, but it did more: It helped me teach better. Based on my review of the students’ answers before class, I was able to improve my lectures by addressing misconceptions and spending more time on concepts the students found difficult. It motivated student engagement in the course. More students did the readings than in previous history of photography courses that I have taught. On both my questionnaire and departmental course evaluations, students reported a high degree of satisfaction with the course. Much of that, no doubt, resulted from a fascinating subject matter that related closely to the students’ personal or career interests. While the data from this study do not conclusively prove it, I believe this satisfaction also resulted from their sense of accomplishment at the amount and quality of the learning they achieved. That remains a topic for future research.

References


