

Course Assessment Practices and Student Learning Strategies in Online College Courses

A Dissertation Study

Bridget D. Arend
Ph.D. Candidate
University of Denver
College of Education

Please contact Bridget Arend (barend@du.edu) with questions or comments about this study.

At a Glance – Results Summary

How is learning assessed in online courses?

A typical online course at CCCOnline includes:

- 29 graded assignments using 5 different methods
- 7 non-graded assignments
- Assignments would be due 10 out of the 15 weeks
- No peer/group work
- The instructor interacts with each student individually 20-40 times
- The instructor responds to students within 24-48 hours
- The instructor provides specific, individualized feedback to students
- The instructor changes the course based on student feedback about half the time
- Students make changes to coursework based on the instructor's feedback about half the time

What kinds of learning strategies are students using online?

- Students use elaboration (summarizing, applying information to new contexts) strategies the most, followed by critical thinking (developing own ideas about course concepts) and self-regulation strategies (adjusting study strategies as needed).
- Students use rehearsal (memorizing, reviewing) and organization (outlining, diagramming) strategies less, about half the time.

How does assessment relate to learning strategies in online courses?

- Most notably, the more a course used discussions, written assignments, and papers, the more students used critical thinking strategies. The more a course used finals/midterms and non-graded assignments, the less students reported to spend time thinking critically.

How is critical thinking encouraged?

- Explicit intent – Assignments that encouraged critical thinking had the explicit intent to be reflective and thought provoking. Written assignments and discussions, as well as journals and problem assignments, asked students specifically to analyze their thinking and develop their own ideas and conclusions about course concepts.
- Time for reflection – Assignments that encouraged critical thinking asked students to spend time thinking critically and reflectively. The asynchronous nature of an online discussion allows students time to process their thoughts. Simply making written assignments and discussions a larger part of the course grade meant students spend more time on these thought-provoking assignments.
- Instructor guidance – Critical thinking was fostered through supportive instructor guidance that continually pushed students to go deeper in their thinking. In discussions especially, instructor comments that were purposeful and probing, without showing the instructors' perspective, encouraged more critical thinking.

Background

This study focused on the interaction between course assessment practices and student learning strategies in online community college courses. As online education continues to grow, it is important to understand the ways that this medium both alters and can enhance learning. Perhaps the most encouraging and understudied aspect of online learning is in course assessment. In the online environment, the lack of physical space and face-to-face contact between instructors and students means the methods of assessment can be very different, typically including multiple and frequent assignments and grading for discussion participation. However, little is known about these online assessment practices or their influence on learning.

Classroom assessment is important because it has a strong impact on learning. Students typically concentrate their efforts towards whatever content or cognitive skills they believe will be tested. Different forms of assessment encourage different types of learning. The assessment tasks and activities in a course influence the *learning strategies* of students. Learning strategies are the cognitive processes students undertake in a course. They range from basic rehearsal tasks to critical thinking or elaboration strategies and are useful for understanding the quality of learning occurring.

The purpose of this study was first to describe the status of course assessment practices and student learning strategies in online courses and explore which assessment practices are related to which learning strategies. The study also explored how certain assessment methods specifically influence the use of critical thinking strategies.

Methodology

The site for this study was the Colorado Community Colleges Online (CCCOonline). This institution was chosen because of its large enrollment, variety of disciplines represented, experience in offering online courses, and diverse representation of instructors and students across Colorado. It was believed that CCCOonline resembles a typical experience for community college students taking an online course.

This study used a mixed-method, two-phase design. In the Spring of 2005, data were collected from three sources; courses, instructors, and students. In Phase I, 60 online courses were sampled across disciplines to quantitatively explore course assessment practices and learning strategies. The researcher spent approximately one hour in each course completing a course survey. Fifty-one instructors responded to a survey asking about course assessment practices. Four hundred and eleven students, or 37% of the students sampled, responded to a modified version of the Motivated Strategies for Learning Questionnaire (MSLQ) asking how often they used various learning strategies in their online course. The student response rate was low, but comparisons with CCCOonline student demographics and response bias analysis indicated the sample was relatively representative of the larger population of CCCOonline students. Student

participants in this study were mostly white (81%), employed (82%), females (75%) who ranged in age and educational background. Reliability estimates for both the instructor and student surveys were deemed adequate.

Phase II was designed to inform the findings from Phase I qualitatively. The findings from Phase I analysis showed a theme surrounding the critical thinking strategy. Phase II focused on the assessment variables that were significantly related, either positively or negatively, to the use of critical thinking strategies among students. Nine courses were selected based on instructor goals and student reported use of critical thinking. These classes created two sample group where critical thinking was a strong goal of each course, according to the instructor, but where students' reported use of critical thinking was either the highest or the lowest compared to other courses. The sampled courses constituted a mix of academic programs across the higher and lower critical thinking use groups. In Phase II, data were also collected from the same three sources. The researcher spent two to three additional hours observing each course. Eight instructors and 29 students participated in phone or email interviews about assessment practices and critical thinking use. (Fifty-one other students also sent in initial responses to Phase II interview questions.) NVivo software was used to code and analyze data.

The results from the Phase II analysis initially showed some contradictory findings such as a higher critical thinking use course where the instructor penalized students for working ahead and a few lower critical thinking use courses with exceptional teaching practices. These findings indicated that the separation of the courses into two groups was by no means a difference of good and bad courses. Rather, there were good and bad aspects within each of these courses whether they stimulated critical thinking or not. The researcher analyzed the data not only across courses but within the context of each unique course and was able to come to some conclusions, in each of the courses, about how and why each course was related to either higher or lower uses of critical thinking. These conclusions were passed on to students in the form of a summary report and all but two of the students agreed with these conclusions.

Results/Study Highlights

Phase I

What summative assessment practices are used in online courses?

Summative assessment was explored in four complementary areas following a breakdown by Angelo (1996) of the American Association of Higher Education's Nine Principles of Good Practice for Assessing Student Learning (Astin et al., 1992).

Use multiple methods - Courses in this study used an average of five different assignment methods. These methods would typically be found in college courses but also include experiential and alternative methods. Group projects, a method highly touted in the online education literature, were not used at all in this sample. Discussion was the most common method; however exams received the highest percentage of course grades.

Table 1
Assessment Methods Used and Percentage of Course Grade

Method	Courses using this method (out of 60)	Average % of course grade
Discussion	59	17.1
Exam	50	44.7
Written assignment	38	23.5
Final/Midterm	23	19.2
Experiential Assignment	20	18.1
Problem Assignment	19	22.0
Quiz	13	3.5
Paper	13	23.2
Journal	10	15.1
Presentation	6	12.5
Pretest	6	1.0
Project	4	12.8
Peer Review	3	4.6 ^a
Form	1	1.0
Group Project	0	--

^aPeer review grades were part of discussion grade and were estimated based on proportion of discussions.

Use multiple assessors - Instructors are primarily assessing learning themselves in these courses, however, self grading was a strong component. All courses used instructor grading, 65% used a form of self-grading, and only 5% used peer review.

Assess over time - Student learning was assessed throughout a course. Assignments were due an average of 10 out of 15 weeks. Discussions were usually graded for ongoing participation over all 15 weeks, so there was typically something a student needed to be actively involved in during all weeks of the course.

Assess multiple dimensions of learning - Most instructors wanted students to be using all of the various learning strategies in their courses, although with different emphasis. Instructors wanted students to be using elaboration strategies the most, followed by critical thinking and self-regulation. Organization and rehearsal strategies were the least desired. (See breakdown on Figure 1, page 7).

Discussion. The online classes in this study appeared to be achieving best practice in summative assessment in many areas. They used a variety of assignments and methods and assessed student learning over time. The courses also appeared to tap multiple dimensions of student learning. However, although half of these online classes used self-assessed activities, in the form of non-graded assignments, instructor grading still predominated.

One possible area of concern is the number of assignments in a course. Although multiple, smaller assignments are deemed better than just a few high-stakes assignments, there is indication that the number of assignments in some classes could be too high, using 50, 60, and even 90 assignments in a 15-week period. In a course with too many short assignments, students and instructors are at risk of focusing their attention on quantity rather than quality. But overall the picture is encouraging. A course where student work is graded through a midterm and final exam would be considered less beneficial to student learning than one where student work is graded in many ways throughout the semester. This latter example appears to be the norm in these online classes.

What formative assessment practices are used in online courses?

The distinction between formative and summative assessment practices was difficult to determine in these online courses. Most assignments were awarded points towards the final grade, but many also occurred over time or were broken into multiple formative parts. In the end, formative assessment methods were classified as those assignments that were not part of the formal class grade.

Non-graded methods – There was an average of seven non-graded assignments in each course, although 30% of the courses did not use them at all. A good number of these assignments were textbook publisher supplemental materials. The use of such assignments appeared to be dependent on academic program.

Formative assessment practices were also explored based on four different aspects of effective student and instructor feedback determined from the literature review.

Frequency of feedback - Instructors reported to interact and provide feedback to students frequently and quickly. The vast majority of instructors, 94%, said they had more than 10 individual interactions with each student during the course, 22% claimed more than 40 interactions. 96% of instructors said they responded to students in less than 48 hours, 60% said in less than 24 hours. Instructors also claimed to provide individual feedback to students regularly. The majority, 86%, claimed to usually or always use student feedback to identify misunderstandings and give students advice to improve their work.

Precision of feedback - Instructors agree more strongly that they provide precise feedback to students. 96% said they usually or always give students feedback based on a good understanding of their knowledge of course material, while 91% did so based on a good understanding of their writing and thinking skills.

Changes in course or teaching - Instructors reported much lower instances of using student feedback to change course content or teaching methods. Only 54% said they usually or always modify teaching methods or techniques while only 40% report to regularly modify or add course materials. Twenty-three percent usually or always used student feedback to change course assignments, and only a few more, 42%, said the same for changing discussion questions.

Student use of feedback - Instructors were also more pessimistic about the amount that students use instructor feedback. Only slightly more than half felt that students usually or always used instructor feedback to make any real changes, such as: make revisions to assignments, 55%, gain a better understanding of the course material, 63%; or achieve more advanced thinking and learning processes, 55%, respectively.

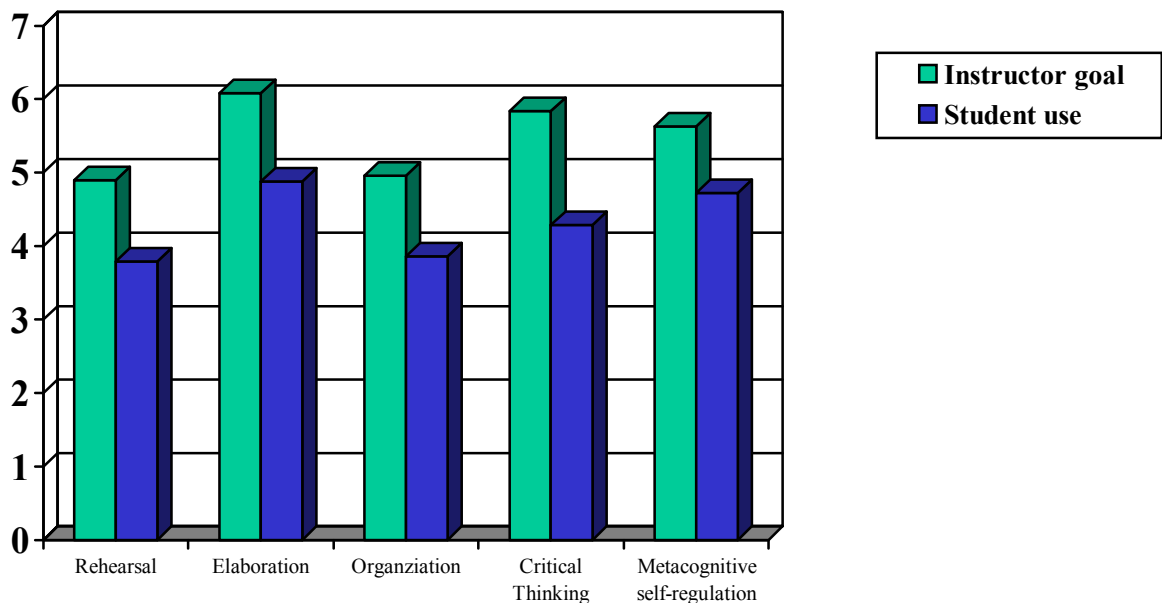
Discussion. These online courses seem to provide timely, frequent, and precise feedback to students, as reported by instructors. Because instructors are spending their time responding to students rather than conducting in-class lectures or teaching activities, online instructors typically report that they know their students better than they would in a larger on-campus class. While this study does not directly explore the quality of feedback, the presence of regular, individualized feedback seems to be the norm online.

In contrast, instructors felt that students only utilized their feedback about half the time. Students must seek meaning and act on feedback if it is to ultimately be effective. This means students should have not only the desire but the opportunity to revise assignments to learn from instructor comments and suggestions. Similarly, instructors did not regularly utilize student feedback to make many changes to their course. This lack of course adjustment could be due to the nature of predesigned courses and adjunct faculty. Overall, both students and instructors are getting a lot of feedback, but it is unclear how much they both act on it to improve learning and teaching.

What student learning strategies are used in online courses?

Learning strategies were based on the five cognitive and metacognitive learning strategy subscales from the Motivated Strategies for Learning Questionnaire (MSLQ): rehearsal, elaboration, organization, critical thinking, and metacognitive self-regulation (Pintrich et al., 1991). Similar to the desired goals of instructors, students reported using elaboration strategies the most, followed by metacognitive self-regulation and critical thinking. Students reported to use rehearsal and organization strategies the least, averaging just slightly more than half the time.

Figure 1
Instructor Goals for Learning Strategy Use and Students' Reported Learning Strategy Use



Note. Based on a 1-7 scale where 1 = never and 7 = always.
N = 51 for instructor sample. N = 411 for student sample.

Discussion. Rehearsal and organization strategies, such as memorizing and outlining, were the least used and desired strategies in these online courses. These findings go against earlier studies that showed rehearsal strategies as the more common study tasks of college students (Pintrich, 1989). This is probably partially due to the lack of a means to test for memorization online due to open-book exams. Also, with the presence of instructor aids such as lecture notes and diagrams, students perhaps have less need to create organizational aids themselves.

The strategies of focus for online students and instructors—elaboration, critical thinking, and self-regulation strategies—are all beneficial strategies for promoting deeper learning. Both elaboration and critical thinking strategies involve some initial knowledge of course content and take it to the next step of applying that information and making judgments. This focus fits much better with the type of learning considered useful for meaningful understanding. Additionally, because both students and instructors found online courses to be independent and require self-reliance, it is no surprise that metacognitive self-regulation skills would be a large component. Self-regulation strategies involve asking questions, determining what one understands and adjusting study strategies accordingly. In an online course with no weekly class time, these strategies are even more important.

Which course assessment practices are related to which learning strategies among students?

The main research question of this study asked: Which course assessment practices are related to which learning strategies? Formative assessment variables, such as extent of personalized feedback, did not appear to relate to learning strategy use. Most general summative assessment variables, such as placement or number of assessments, also did not relate to learning strategy use. Instead, it was mainly the use of individual summative assessment methods, such as discussions or papers, that were significantly related to learning strategies.

A few findings emerged for the organization and self-regulation strategies that were not deemed overly notable. A larger group of findings emerged for the elaboration strategy. However, the most comprehensible theme emerged for the critical thinking strategy. Discussions, written assignments, and papers were positively related to the use of critical thinking whereas finals/midterms and non-graded assignments (in the form of number of assessors in a course, the number of non-graded assignments, and the number of non-graded methods) were negatively related to critical thinking. Table 2 lists the significant findings for the critical thinking strategy.

Table 2
Significant Relationships between Course Assessment Variables and Student Learning Strategy Variables for the Critical Thinking Strategy

Learning strategy	Positive relationship	Negative relationship
Critical thinking	Number of discussions $r(410) = .151^{**}, p = .002$	Number of final/midterms $r(410) = -.098^*, p = .047$
	Number of written assgmts $r(410) = .102^*, p = .039$	Number of non-graded asmts $r(410) = -.167^{**}, p = .001$
	Number of papers $r(410) = .115^*, p = .020$	Number of non-graded meths $r(410) = -.179^{**}, p = .000$
		Number of assessors $r(410) = -.118^*, p = .017$

* $p < .05$ ** $p < .01$.

Discussion. The small correlation sizes indicate that influencing student learning is a complex undertaking with many variables involved. However, there is a pattern that exists here. Although there are many factors involved in teaching and learning, there is a relationship between the use of certain assessment methods and the use of critical thinking. This set of findings surrounding critical thinking was the model for exploration in Phase II.

The more a course used discussions, written assignments, and papers, the more students used critical thinking strategies. The more a course used finals/midterms and non-graded assignments, the less students reported to spend time thinking critically.

Does the use of summative and formative assessment practices and student learning strategies vary by discipline or course type?

In looking at course assessment practices and learning strategy use, it was important to explore if any differences were due to course level, enrollment, or academic program/discipline. Course level did not make a difference in any of these variables. However, larger enrollment courses had more non-graded assignments, assignments that were due less often, and focused more on rehearsal and organization strategies. Also, the use of certain assessment methods often varied by academic program. Many programs tended to favor either papers and written assignments, or problem assignments. Programs considered to be in the math and science realm used more problem assignments and experiential assignments. Programs related to humanities or social science relied more on written assignments and other methods such as journals or presentations.

Discussion. Although it could be assumed that differences in the type of course offered would most strongly influence assessment practices or learning strategies in a course, these variables did not appear to influence overall study findings. Assessment methods were often tied to academic program but learning strategy use especially varied across disciplines. For example, one science course had some of the highest reported uses of critical thinking whereas a nearly identical science course in the same sub-discipline area was among the lowest reported uses of critical thinking. The main differences in assessment practice and learning strategy use seem to be based within each specific course.

Phase II

The purpose of Phase II was to use qualitative data to further inform the findings from Phase I. The model that discussions, written assignments and papers were positively related to critical thinking whereas final/midterms and non-graded assignments were negatively related was explored in more detail to discover how and why.

Are student learning strategies influenced by course assessment practices in this study?

Reinforcing the underlying premise of this study, students in Phase II overwhelming said they change their study habits based on a specific class or instructor. These decisions were usually based on the instructors' assessment practices, limited study time, and the nature of the online environment itself. Students judge how to spend their time based on the perceived emphasis placed on certain assignments by the instructor and by the course grades. These students are busy adult learners, and assignments deemed least important often get left out. And the online environment changes study habits as well in that students feel the need to be more self-reliant in online courses. However some students, even these adult learners, are not used to this role.

Does the relationship hold that the use of discussions, papers, and written assignments leads to higher uses of critical thinking and the use of final/midterms and non-graded assignments leads to lower uses of critical thinking?

The quantitative, Phase I model was based on correlations, which do not show causation. However this causal relationship, that assessment practices influence learning strategies, is backed up by the literature on assessment and learning as well as the qualitative findings in this study. The Phase I model was supported by qualitative interview data as well as the sample itself. Of the nine sampled courses, the higher critical thinking use courses had more focus on discussions, papers, and written assignments while the lower critical thinking use group focused more on exams, final/midterms, and non-graded assignments.

How do assessment practices influence the use of the critical thinking strategy?

Scholars from across disciplines believe that a major goal of their area is to foster critical and analytical thinking. The definition of critical thinking used in this study is developing one's own way of thinking about course materials (Pintrich et al., 1991). Critical thinking is more than a collection of knowledge or a collection of skills, but rather it is the development of a habit of using analytical skills (Scriven & Paul, 2005). During qualitative data analysis, a few global themes emerged. Assignment methods that supported higher uses of critical thinking

seemed to be influenced by using explicit intent to provoke critical thinking, by providing time for reflection, and by the use of appropriate instructor guidance. These themes will be described for each assignment method below.

Assignment methods that supported higher uses of critical thinking used *explicit intent* to provoke critical thinking, provided *time for reflection*, and used appropriate *instructor guidance*.

Written Assignments/Papers

Explicit intent. Written assignments and papers, although considered separate methods in Phase I, were talked about together in Phase II. The intent of written assignments and papers in this sample was usually to provoke critical thinking among students. These assignments were more formal in nature than online discussions, and the purpose was for students to develop and defend their own opinion on a topic or theme, or to be creative and explore a topic in their own words. One student explained, “The essays...made me reflect more on the subject matter. I couldn’t just ‘spit-out’ an answer but rather I had to form my own opinions and analyze events in the book.” Written assignments typically invoke critical thinking because when writing, students are often forced to consider different perspectives by paying attention to the different audiences of the paper (Biggs, 1988).

“I couldn’t just ‘spit-out’ an answer but rather I had to form my own opinions”

Time for reflection. The use of written assignments gives students specific instructions to devote time and energy towards thinking critically. In courses with higher critical thinking uses papers and written assignments often constituted the majority of the course grade, making students spend much of their time on this strategy. Written assignments also often built on each other so students could practice skills and learn from mistakes. Said one student, “I could learn from my previous assignments, correct my mistakes, and use what I had learned for the final paper.”

Instructor guidance. Written assignments also allowed students to demonstrate their learning and knowledge to instructors. Students commented how these assignments let them put their knowledge into words. In fact, when asked what assignment best demonstrates student learning, the highest response for both instructors and students was written assignments. Written assignments can make a student’s thinking visible and allow instructors to provide whatever feedback or make whatever adjustments are necessary to best suit the needs of the student.

Online Discussions

Explicit intent. The purpose of the online discussions in this study was to provide an informal learning opportunity where students explore different concepts, apply course material to real life, or dig deeper into a concept or topic. One instructor described the discussions as “a ‘free speech’ forum for opinions based on research and facts.” The informal nature is beneficial for critical thinking. According to one student, “I think the discussions were the best because we could freely say what we thought without being graded on structure.” Online discussions are effective places for instructors to coach and develop deeper and more reflective learning because they put emphasis on the elements of an argument and the exchange of ideas (MacKnight, 2000).

In courses more aligned with arts and humanities, the focus of discussions was to explore different views of a topic or concept. Students valued this focus and used words like, “defend,” “justify,” and “argue” to describe the process. One student explained, “I learned a few things about my thinking process and I also learned to give credit to others opinions.” In math and science courses, the focus was to see multiple strategies for solving a problem. Said one student, “It helped me see how others looked at various problems and encouraged me to look closer at my methods.” However, a few of the math and science courses had some trouble keeping the discussions interesting and interactive. Students generally did not like when there was little interaction or when responses were repetitive.

Time for reflection. Students in all disciplines talked at length about how they had to spend time thinking about their responses and looking for references or ideas to support their postings. One student describes this in detail:

“I was researching answers to [discussion] questions all week. The instructor posed questions at the beginning of the week, so I always posted a thought-out answer to that, and then as the week went on, I would comment on what other people had written. Because I was “required” to respond to their questions as well, I tended to think a bit more about what they had said. Also, if someone posted a comment that I completely disagreed with, I went back to the text or Internet to find a credible source to give credit to my opinion. The questions [the instructor] posed, coupled with the requirements of interacting with other students, helped me to form my own opinion.”

Students and instructors felt there was a deeper level of thought without the on-the-spot pressure of synchronous discussions. In face-to-face classroom discussions, longer time delays between instructor questions and student responses are related to more student engagement and better performance (Cotton, 2001). In online discussions, students have as much time as they need to reflect and process their thoughts. However, this asynchronous nature can also be challenging. It was harder for some students to express themselves in writing and

the delay in conversation made some discussions difficult. Also, some students who were admittedly less social did not like being forced to participate.

Instructor guidance. There appeared to be no differences between the higher and lower critical thinking courses in terms of the purpose and opening questions of the online discussions. However, there was a noticeable difference in the way instructors facilitated discussions. Instructors in the higher critical thinking use group responded much less frequently, more impartially, and used more probing questions in discussions.

“I liked how the instructor remained neutral throughout the class and posed questions to encourage discussion. I actually enjoyed when [the instructor] challenged me to think more about a statement I posted.”

Instructors in the higher critical thinking courses participated less often than the other instructors. However, these instructors were very present and their responses were purposeful. They also appeared more impartial in their comments. Most instructors were continually questioning or extending the discussion using a neutral tone. For example, one instructor post read, “Thanks for your contributions. Now some in this debate would say [presents one side of argument]...while others defend [presents other side]...your thoughts?” These

instructors would also respond with very specific questions, pushing students to go further in their thinking. Another example read, “Nice start. Now how do you think [the concept under discussion] evolved from that point in history to where it is today?” Students appreciated this tactic. “I liked how the instructor remained neutral throughout the class and posed questions to encourage discussion. I actually enjoyed when [the instructor] challenged me to think more about a statement I posted.”

In contrast, in the lower critical thinking use group, instructors often responded to nearly every student posting. It was also common to see instructors provide comments that showed how they felt on an issue. Even postings such as “I agree” or “good point” can let students know the instructors perspective. It appears that a comment such as “great job”, while supportive, may signal an end to the conversation, whereas a comment such as “Interesting, how do you think others would react to your statements?” encourages the student to think a bit more about the topic and other perspectives. The success of this continual questioning is consistent with the

It appears that a comment such as “great job”, while supportive, may signal an end to the conversation, whereas a comment such as “Interesting, how do you think others would react to your statements?” encourages the student to think a bit more about the topic and other perspectives.

literature on inquiry methods of teaching, also known as the Socratic method. In an inquiry approach, the instructor’s role is not so much to lead students to a correct answer as to carry on a dialogue that helps contribute to a deeper understanding (Davis & Davis, 1998).

A possible downside of more limited instructor postings is that some students felt the discussions should be a very instructor-led space. Students may not be accustomed to discussing and learning from each other. Especially in math and science courses, students may have a desire to learn from the instructor and see discussions as frivolous. Said one student, “I trust what the instructor has to say, not other students.” Students may need guidance and time getting used to open-ended, collaborative discussions. And instructors not only need to foster student thinking, but need to monitor the discussions, keeping them from being dominated by just a few individuals or becoming too personal.

Other Methods That Appear to Encourage Critical Thinking	
Journals	Problem and Experiential Assignments
<p>Even though only two of the Phase II sampled courses used journal assignments, and they showed no significant relationships in Phase I, the value of journals for encouraging critical thinking emerged. Journals were usually free-form assignments, not critiqued but rather used for students to express their thoughts. Students were asked to use the journals to reflect personally on material and explore ideas in relation to their own lives. Although not a specific part of written assignments, and instructor guidance may be lacking, journals were another example of a type of assignment that give explicit intent and reflective time for students to think critically.</p>	<p>Two other types of assignments that were not part of the quantitative model but emerged in the qualitative data were problem assignments and experiential assignments. These assignments more commonly appeared in the math, science, and computer science courses that did not have written assignments. While the intent of these assignments may not have been as clearly aligned with critical thinking as defined in this study, many students and instructors talked about the value of these assignments in provoking thought. One student commented, “with the lab assignments...you had to put a lot of things in your own perspective and writing. It wasn’t just something you could copy off the Internet or from the text, you had to be creative and descriptive.” These assignments also showed signs of following the beneficial themes for encouraging critical thinking of explicit intent, time for reflection, and instructor guidance.</p>

Non-Graded Assignments

Explicit intent. Non-graded assignments seemed to fall into two types with two different intents. The first type, *problem-based*, consisted mainly of worksheets and practice questions and were used in math and science courses for students to gain practice with the material. These assignments were useful and could encourage higher-level thinking, but often did not fall under the specific definition of critical thinking because there was typically one right answer to the problems. The second type of non-graded assignment, *knowledge-based*, was more common across all courses in the full sample. These assignments were typically automatically graded quizzes based on reviewing the concepts and vocabulary in the text. Similar to problem-based assignments, the goals for these knowledge-based non-graded assignments appeared to be for purposes other than critical thinking.

Time for reflection. Students used problem-based assignments fairly regularly and did like the ability to see their strengths and weaknesses and get a better understanding of the content. The knowledge-based assignments were not used very often. Some students reported to use them at first, but then their use often dropped off as their lives got busier or if they realized the exercises did not help them very much in the course. For those students who did use these activities and found them helpful, the most common reason cited was preparing for the course exams.

Instructor guidance. Instructor support for non-graded assignments depended on the type of assignment. At least three instructors pushed the use of problem-based assignments and used them as a vital part of the class. But for knowledge-based assignments especially, instructors had no way of tracking if students actually completed them. "I have links to a lot of quizzes they can take...but again, I don't know who's using them, who's not using them, or how much." Knowledge-based assignments were more commonly seen in courses and appeared to simply be added to the coursework each week without much support.

Final/Midterms and Multiple-Choice Exams

Because of the small use of finals or midterms in the Phase II sample, it was determined this method would not be specifically explored. However, there were many comments and reactions from students and instructors in Phase II regarding multiple-choice exams. These exams were essentially smaller versions of final or midterm exams and will be discussed together.

Explicit intent. Like the non-graded assessments, multiple-choice exams were typically of two types, problem-based and knowledge-based. Multiple-choice questions can be very complex and tap higher order thinking and many of the problem-based exams in this study appeared to do so. But most of the multiple-

choice exams observed by the researcher were knowledge-based exams. Instructors seemed to use these exams as a discipline tool, for the purpose of ensuring that students read the assigned chapters. Students agreed, “Tests were...more about what I read than the knowledge I gained.” The intent of these multiple-choice knowledge-based exams has changed from a traditionally summative role to a more formative role. Their usefulness appears to be not as an indicator of student knowledge, but for students to practice with material and test their own understanding. According to one instructor, “The value lies in the use of the quiz as a pointer rather than an absolute ‘one chance’ metric.”

“The value lies in the use of the quiz as a pointer rather than an absolute ‘one chance’ metric.”

Time for reflection. Because all online exams are essentially open-book, students can and do use study aids during tests. As a result they use less rehearsal strategies. According to one student, “I memorize less detail during the chapter readings. There’s plenty of time to look up some answers in the text during the testing.” Some students like these exams because it helps them retain the information. Others feel they are simply easy assignments in the course. “I didn’t review the material before taking the quiz; rather I just jumped right in...it seemed to me that it was a nice way to review the material for some ‘easy’ points.” Students use these exams to monitor their own knowledge and see if they need to study more or less. They decide themselves how to use the exams and how much time to devote to them.

Instructor guidance. Instructors agreed that knowledge-based, multiple-choice exams do not give them a good sense of a student’s learning. One instructor explains, “The quizzes give the least sense of a student’s learning, but I require it so that the students at least attempt to read the text and understand it.” However, these instructors claim to use such exams because they feel they are supposed to. Most online courses have multiple-choice exams and they are a standard, accepted form of classroom assessment. “We’re still in the process of getting people to accept online. So by putting multiple-choice tests in there, and making those tied to the chapters, people can accept it.”

In what ways do instructors grading practices influence student learning?

Grading practices. The majority of students seemed pleased by the way instructors graded their work. Students spoke of their instructors as fair, supportive, timely, encouraging, and helpful. The researcher observed many encouraging and accommodating instructor comments. Students also generally liked the ability to submit assignments early or resubmit assignments. They appreciated when instructors took the time to grade by giving partial credit, providing feedback, or pushing students to think deeper. However, students disliked when instructors did not answer questions well, when grading did not

By far the biggest complaint was instructor feedback that did not adequately explain why a student got a certain grade for an assignment.

appear to be consistent, or when little or no feedback was given. By far the biggest complaint was instructor feedback that did not adequately explain why a student got a certain grade for an assignment. Even with the use of grading rubrics, students did not always understand the grading. In at least one example, this led a student to comment, “it makes it appear as if the class was being run from a script, without the teacher devoting any real time or effort to analyzing students’ work.”

Instructor workload. Online courses are known to cause a heavy workload for instructors. There were some hints in this study that instructors’ workloads may be so overwhelming that they are simply trying to keep up with the multiple assignments and cannot devote much time to student learning. However, the instructors in Phase II of this study felt the workload balance was acceptable. These instructors said they spent most of their time monitoring discussions, grading, responding to emails, and making changes to the course, in that order. “I find the workload the correct balance for me. I like doing all the pieces I do and feel I’m not short-changed anywhere.” Only one instructor showed signs of disagreement, saying, “The grading does seem to demand more of my time at the expense of teaching.”

Phase II Discussion. Critical thinking is a widely valued and appreciated learning strategy for students. College students, even adult learners, are not initially ready for critical thinking and need to develop these analytical skills gradually throughout their college classes (King & Kitchener, 1994). It should be the goal of most college courses, whether online or face-to-face, and regardless of discipline, to contribute to the development of critical thinking among students.

Based on the findings of this study, if critical thinking is a goal of a course there are certain assessment methods that should be utilized more than others. Additionally, when assignments are used, instructors and course designers should take care to ensure that the intent of the assignments align with the promotion of critical thinking, that students are given time for reflective thinking, and that instructor guidance and facilitation is conducted in a way to promote further thinking about a topic or concept.

Non-graded assignments have become a part of online courses and can be useful for practice and knowledge purposes. However, the quality and benefit of this automatic feedback is not known. If these practice opportunities do not provide the necessary feedback for learning, they will either not be used or may take time away from other course assignments. Similarly, these courses are using knowledge-based multiple-choice exams for disciplinary purposes, to ensure that students read the text. However, with busy adult students who admittedly prioritize and cut corners when studying, the ultimate usefulness of these exams is questionable.

Students in this study craved instructor feedback. In written and problem assignments, instructors should be providing detailed and timely feedback so students have a chance to learn from their mistakes and continually improve. Also, to facilitate effective discussions, it appears an instructor should play a neutral role, asking probing questions that continually push students to think further about a topic. Instructors should be sociable with students and share their personality. But an instructor who explicitly shares his or her thoughts on the topic under discussion may be inadvertently shutting down the thinking process. Rather, instructors should be stepping back and asking relevant, thought-provoking questions that keep the students at the center of the inquiry. Essentially, the focus should be on quality over quantity in facilitating discussions.

All this creates a heavy workload for busy instructors. However, these online instructors felt their workload was acceptable. One of the most important online teaching tasks is grading. Because student motivation is influenced so strongly by assessment, grading is the ultimate teachable moment. In online courses especially where lecture time is missing, grading is one of the most visible and motivational avenues to direct student learning, diagnose misconceptions, and provide specific guidance to students. Instructors should see and understand the importance of grading online as a central part of teaching.

Assessment is extremely important in determining what students spend their time and energy doing. Students do what they are asked to do through course assessment practices. Thus, educators should focus their efforts on ensuring that course assignments ask students to spend their time on the most relevant and important cognitive tasks. Instructors need also to use their frequent feedback and grading mechanisms to support and challenge student thinking. With the limited time that students have, we want to maximize what they do and support them in these efforts, rather than give them busy work they can cut out.

Recommendations

This study was based on a limited sample of one institution and is not generalizable to all online or face-to-face courses. Additionally, the field of online education and course assessment is still in need of a broader base of research. However, some general conclusions can be drawn based on this study and the online, assessment, and learning strategy literature. Following are some general recommendations that reflect what seems to be known at this point in time about online course assessment practices and student learning strategies.

Conclusions

- Online courses likely provide more assignments, more assessment methods, and include more frequent and personalized contact between instructors and students than larger enrollment face-to-face undergraduate courses.

- Online courses use assessment practices that combine some of the best features of both summative and formative assessment and students appear to spend their time on relatively advanced learning strategies.
- Information isn't given to students the same way in online courses but rather students often have to think and discover knowledge for themselves. Many students are not used to this more active educational role.

Design Assessments for learning

- Online instructors and course designers must strike a balance between using frequent small assignments to keep students engaged and focusing on larger, more conceptual assignments that promote deeper learning.
- One effective model for online assignments is the use of a few large assignments consisting of different components, broken into multiple parts due throughout the semester, with time for instructor and peer feedback and revision in between.
- The value of knowledge-based multiple-choice exams should be examined. These assignments are valuable as a discipline tool to assure students do the readings, but do not give instructors much information about actual student learning.

View grading as teaching

- Students crave feedback on their work and need support in becoming self-directed learners, especially in an online environment. Because student motivation is tied to assessment and grades, grading is an ideal teachable moment.
- Effective instructor feedback includes specific information about student work and how to improve. More feedback is better, but the quality of feedback is most important.
- Effective grading also provides built-in opportunities for students to learn from and act upon instructor feedback (partial credit, re-submissions, draft assignments, assignments broken into smaller parts).

Encourage critical thinking

- Critical thinking occurs over time and needs support and guidance. Most higher education courses should have critical thinking goals and support students in their efforts to question and analyze information. It is the responsibility of all instructors in all courses to develop these skills among students.

- Students do what they are asked to do. If students are not spending time thinking critically in a course it is often because their assignments do not explicitly ask them to do so.
- A course with critical thinking objectives should use informal discussions where students can safely experiment and explore different ways of thinking about a topic or problem. Instructors should facilitate by asking thoughtful, probing questions. Frequent “good job” comments by instructors are encouraging but do not push students to think further.
- A course with critical thinking objectives should also use journals and formal written or problem assignments. Asking students to write out their thoughts or show their work makes student understandings visible and encourages further critical thinking.

References

- Angelo, T. A. (1996). Relating exemplary teaching to student learning. *New Directions for Teaching and Learning*, 65, 57-64.
- Astin, A. W., Banta, T. W., Cross, K. P., El-Khawas, E., Ewell, P. T., Hutchings, P., et al. (1992). *Nine principles of good practice for assessing student learning*. Retrieved April 19, 2004, from the American Association of Higher Education website: <http://www.aahe.org/assessment/principi.htm>
- Biggs, J. B. (1988). Approaches to learning and to essay writing. In R. R. Schmeck (Ed.), *Learning strategies and learning styles* (pp. 185-228). New York: Plenum Press.
- Cotton, K. (2001). Classroom questioning. *School Improvement Research Series Close up #5*. Retrieved September 25, 2005, from the North West Regional Educational Laboratory website: <http://www.nwrel.org/scpd/sirs/3/cu5.html>
- Davis, J. R., & Davis, A. B. (1998). *Effective training strategies: A comprehensive guide to maximizing learning in organizations*. San Francisco: Jossey-Bass.
- King, P. M., & Kitchener, K. S. (1994). *Developing reflective judgment: Understanding and promoting intellectual growth and critical thinking in adolescents and adults*. San Francisco: Jossey-Bass.
- MacKnight, C. B. (2000). Teaching critical thinking through online discussions. *Educause Quarterly*, 4, 38-41.
- Pintrich, P. R. (1989). The dynamic interplay of student motivation and cognition in the college classroom. *Advances in Motivation and Achievement: Motivation Enhancing Environments*, 6, 117-160.
- Pintrich, P. R., Smith, D. A. F., Garcia, T., & McKeachie, W. J. (1991). *A manual for the use of the Motivated Strategies for Learning Questionnaire (MSLQ)*. Ann Arbor, MI: Regents of the University of Michigan.
- Scriven, M., & Paul, R. (2005). *Defining critical thinking*. Retrieved September 26, 2005, from the Foundation for Critical Thinking website: <http://www.criticalthinking.org/aboutCT/definingCT.shtml>