

DISCUSSION QUESTION DESIGN AND ADMINISTRATION

Ronald G. Benson, Ph.D.

University of Maryland University College

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Barker (2001) notes that there are four essential components of online education: “1) the web based resources that are used to provide basic content, 2) an online support infrastructure (tutors and technical help), 3) communication strategies that underlie course-related online dialog and student discussions, 4) the various learning tasks undertaken by students during a given course.” The third one of these is more of an art than a science and student satisfaction has been found to be highly correlated with interactions in the course room (Kirby, 1999; Mazzolini and Maddison, 2003). Lim (2004) discusses six issues that need to be considered for effective inquiries which address components 3 and 4 of the above. These are 1) seeking a balance between a system-generated guide and human facilitator, 2) visual representation of the inquiry process, 3) motivating learners with the right question, 4) engaging learners in various learning activities, 5) guiding the inquiry process with various scaffolds, and 6) maximizing learning by coordinating resources, tools and the community of inquiry. Issue #3 on Lim's list, “motivating learners with the right question,” is the focal point for this paper concerning the design and administration of discussion questions.

A distinguishing feature of online education verses the face-to-face education mode are class discussions. In a face-to-face environment, class discussions typically are spontaneous interplay. A minority of the students are actively involved. They are haphazard in their preparation, intent and results with participants appearing to be mostly the verbal-oriented and self-confident members of a class. Data to evaluate and improve discussion questions is mostly, if not always, anecdotal. Discussions often are a presentation technique to avoid lecture lethargy or sleepiness and not considered a prime facilitator of the education process.

In contrast, in an asynchronous online environment, discussion questions are planned and students and faculty respond with considered answers. Faculty can carefully craft questions to fit content and student needs. Respondents, both students and faculty, can carefully research and craft their responses. The achieved learning from online discussions is potentially much greater than in a face-to-face environment. Discussion design and facilitation has an indispensable role in online education and is dependent on carefully crafted questions.

This paper will discuss two major topics: objectives that can be achieved via discussion questions, and conference (set of discussion questions) administration. The content is based on a combination of scholarly articles (see references) and observations from the author's academic experience. This includes 20 years of face-to-face teaching of Operations Management and Information Technology courses and administrative positions of Department Chair, MBA Coordinator and Business School Dean. The online experience includes seven sections in the masters level Technology Management program at the University of Maryland University College and additional doctoral level courses in organization and management at another university. In 1990-1992, the author

participated in a research project funded by IBM concerning designing courses for an “Advanced Technology Classroom” at Western Connecticut State University which involved guided discussions and visualization.

Discussion Question Objectives

Learning objectives define the end results that are to be achieved in a course and learning unit. Discussion questions are a critical means to achieving these. Discussions have other subsidiary roles which are also important. Following is a discussion of these two areas.

Reading of assigned materials

It is all too easy for students to read without learning, or tempting to not read assigned material at all. A common objective of discussion questions is to ascertain that students have read and especially have comprehended the assigned material. The mini-lectures provided by the instructor, assignments and exams assist in this as well, but discussion questions enable this in a practice mode, and in a peer motivated manner. Motivation to read and study the assigned materials comes from knowing that not only the instructor but fellow students will be reviewing their work. It also allows trial answers, and insights to be gained from other student’s answers. There is a gut check involved in clicking on “Submit.”

Questions need to be composed that use terms or concepts found in the reading material which cannot be answered without having read the material. They should not request a mere repeating of something from the reading material. A question such as “What are the three points that the author made concerning innovative idea?” does not leads to discussion nor even a confirmation of knowledge acquisition. An alternative might be “Illustrate one of the author’s concepts on promoting innovation by citing an example of an innovation that illustrates this.”

Critical Thinking

Bloom’s taxonomy provides useful objectives for developing and evaluating discussion questions. And they have a direct correlation with desired management competencies making the categories critical considerations in management oriented curriculums. Appendix A contains a version of Bloom’s taxonomy. Table 1 uses this to list the Bloom competencies in column one and shows a possible renaming of these to manager competencies/responsibilities in column two. Example discussion questions for each are shown in the third column, which were taken from the authors classes: TMAN 611 Introduction to Technology Management and TMAN 622 Systems Development, Acquisition and Management.

Critical thinking competencies are focused on the last four areas: application, analysis, synthesis, evaluation (Bissell & Lemons, 2006). The table by the Learning Skills Program of the University of Victoria (2005) in Appendix A contains a list of verbs that are particularly helpful in composing discussion questions that address the higher order competencies. One conclusion that derives from using these is that discussion questions

are often not questions but rather imperative statements: apply this; explain; integrate, recommend, etc.

Blooms taxonomy is a useful classification system that provides a source of question ideas and a check list to develop questions. A revised Bloom's taxonomy is shown in Appendix B that can offer further perspectives. (Chyng & Stepich, (2003); Krathwohl, 2002).

Case studies work exceptionally well with discussion questions when addressing Bloom competencies. Cases can vary from a few sentences describing a unique situation to a 30 page description of an entire organization or industry. A vignette could be as short and yet complex as follows and the responses will cover the range of Bloom competencies. Note that this particular question, although within the course context, was not related to particular course content and was intended to encourage critical thinking in an area related to student interest.

Consider a situation where the CEO of a company requests an Enterprise Resource Planning implementation and the IT manager thinks the present systems are just fine. The IT manager starts a project mostly to placate the CEO. Offer advice to the person who is put in charge of the project that reports to the IT manager.

Table 1: Bloom's Competencies and Manager Responsibilities

Competency	Typical Management Situation	Possible discussion Questions
Knowledge	Understand basic job tasks	(Included in all of the following)
Comprehension	Summarize a problem situation.	Find a source that describes how to effectively create PowerPoint (or other vendor) presentations, and summarize the main points.
Application	React to environmental situations or changes	Describe any lessons you personally learned from the International Air case? Anything particularly hit home? Was there anything in the case that you think needs to be emphasized or communicated, or that is commonly done poorly?
Analysis	Determine root causes of problem situations.	Why did the International Air "make" option fail, while the "buy" option succeeded?

Synthesis	Derive problem solutions	Compose a job description and requirements for a Chief Technology Officer.
Evaluation	Report results or progress. Develop performance measures/techniques	How do you know if sufficient planning has been done? How much planning is enough planning? Can you over plan? If so, what are the symptoms and problems? How do you know if the plan has not had sufficient thought? Intuition?

There is some research evidence that critical thinking skills are more effectively taught in an online mode. Conceico (2005) in a phenomenological study recorded the following faculty reaction.

There's a tremendous gratification in [online teaching] because of how well I get to know the [learners], and I believe the opportunities I have to assess their application of the knowledge and skills that we're talking about during the semester.... I feel like I can have a greater impact on each individual [learner].

Library Appreciation

Students often note, after a little experience, that the online library capability is "awesome." It is immediately available from the course room at anytime and with little effort. The non-productive physical efforts of library usage have been removed in the online mode. Discussion questions can lead to very creative searches for information not in the reading material, but relevant to the course. Further the question can be tailored to the particular interests of each student. An example is "Find and summarize an article on organizational critical success factors that is relevant to the company in which you are or have been employed."

Information search habits

An educated person is one who seeks knowledge in response to a situation, instead of merely opining personal biases. This is a habit that needs to be cultivated among students. Library searches fit in this realm, but internet searches are progressively becoming a critical source of data. The word data is used because the results needs to be evaluated, compared, synthesized etc. before use; that is apply critical thinking skills. Discussion questions that require searching create an awareness of the vast amounts of data available on the internet. Student discussions can assist in looking at results with a critical eye. An example is the question related to the comprehension category in Table 1 PowerPoint presentations are not taught per se, and of course this is a common manager

requirement, and often done poorly. Another effective way of addressing this is to provide an example PowerPoint presentation that has problems, and have students critique it using the criteria from a web site of their choice.

Later Topic Preparation

One can create interest or develop some background for a forthcoming topic in a course by posing a discussion question related to the topic. For instance interest and background concerning technology transfer can be setup by a question that requires a search in the United State Patent and Trade Office web site for a patent related to some topic of student interest. Students then have a perspective, hopefully interest, concerning technology transfer and its limitations before the topic is covered. This also can be used to reduce stereotypes or biases before a topic is introduced. For instance, a question could be, “Discuss the pros and cons of globalization.” This starts a thinking process in motion that helps them focus when reading upcoming assignments and answering future discussion questions.

Course Community Development

The “Quest for Community,” to use the title of Nesbitt’s (1953) book, is an inherent longing for most and therefore an important objective. Discussion questions, over time, spontaneously create an appreciation of colleague roles, senses of humor, demeanors, etc. all of which would be missing without the discussion questions. Questions that prompt some personal information at the start of the course start this process. This is critical to student satisfaction and student retention. It also helps in the setting of norms for interpersonal behavior in the course room, and probably outside the classroom. Student retention is a critical consideration. University survival (and faculty positions) depends on retention of students. Getting students involved in meaningful discussions creates a community and seemingly could thereby contribute to retention. An interesting side effect of good questions is that they sometimes provide discussion topics for students at their place of employment. Discussion questions that prompt higher levels of thought have led to student postings stating something like “I posed this question at a coffee break today, and found a unique perspective to this.” Not only does this broaden the search process, but it may be functioning as a recruitment vehicle for future students.

Congruence

The “bottom line” of creating discussion questions is to assure that they are congruent with learning objectives for the course and the learning unit. Almost all course objectives contain references to the competencies typical of the Bloom competencies. Chyung and Stepich (2003) provide a useful approach to checking this that also illustrates a revision to the Bloom taxonomy shown in Appendix B.

Ineffective Discussion Questions

It may seem trivial at this point to note tasks for which discussion questions are not appropriate, but these do periodically appear, even in training sessions. Basically, questions should provide opportunity for discussion. If they do not, then they should not be used.

Factual questions for which there is only one answer and for which responses are binary, (yes/no, true/false) serve no purpose in a discussion. The only discussion might be whether an answer is right or wrong and discussions of this sort tend to negate the collegial environment needed for successful discussions.

Questions that amount to little learning and therefore are merely busywork are inappropriate. Examples are questions that ask for information that requires little more than a retyping of another document.

Question Criteria

In summary, a simple set of criteria to review questions, especially new ones, is as follows.

Questions should:

- be open ended enough so everyone can answer differently based on their backgrounds, knowledge or perspective—no one correct answer,
- be challenging enough to separate those who are more knowledgeable or capable, and,
- be challenging enough to require a search for information.

Conference Administration

Posing questions is only part of the effort that faculty must make. This section addresses administrative issues of conferences made up of multiple discussion questions.

Question Choices

It is effective to offer alternative discussion questions and let students choose those that match their work experiences (or lack thereof), learning styles, or other characteristics pertinent to them. For instance, those with minimal work experience can focus on questions that involve library tasks. Requiring students to answer any three of five questions works well for classes of approximately twenty students. Larger sections may need more questions to choose from. Smaller classes may need fewer (answer 2 or 3?) to ensure that all questions are adequately addressed.

Student backgrounds vary greatly in the amount and breadth of work experience, undergraduate education, academic areas and interests. This is viewed by some online instructors as a definite positive with online teaching. One of Conceicao's (2006) participants noted that they "learned a lot more from his online learners than face-to-face learners because the profile of the online learners had a tremendous influence on how the

experience evolved.” Another noted “I have learned ... from my online [learners] a lot more than I have learned the previous 15 years from my on-campus [learners].” Online students also have differing learning styles and question choices offer a means for students to self select a style that fits. Table 2 illustrates this for activist, theorists, pragmatists and reflectors (Muir, 2001). Again, allowing students to choose from among questions caters to differing learning modes.

Table 2: Learning styles and student response characteristics.

Learning Style	Respond well	Respond poorly
Activists	New problems, being thrown in at the deep end, and team work	Passive learning, solitary work, and precise instructions
Theorists	Interesting concepts, structured situations, and opportunities to question and probe	Lack of apparent context or purpose, ambiguity and uncertainty, doubts about validity creates a lack of basis for learning
Pragmatists	Relevance to real problems, immediate chance to try things out, and experts they can emulate	Abstract theory, lack of practice or clear guidelines, no obvious benefit from learning do not allow pragmatists to apply learning to real-life situations.
Reflectors	Thinking things through, painstaking research, detached observation	Being forced into the limelight, acting without planning, time pressures creates a tense learning environment.

Constructed from information in Muir, D.J. “Adapting Online Education to Different Learning Styles”, In Building on the Future. NECC 2001: National Educational Computing Conference proceedings (22nd, Chicago, IL, 2001)

Students should be instructed to read all postings and a goal is to have discussions stimulating enough to intrinsically motivate this behavior. Of course, there is not an objective way of knowing if all are read. A downside to this is that as discussions threads lengthen, the reading work load increases for both students and faculty, perhaps causing thread lengths to diminish.

Knowledge application from experiences

Content is not knowledge unless it can be used. So-called “war stories” provide a medium for thinking about course content. Using life experiences to illustrate concepts contributes greatly to internalizing knowledge; helping to bridge the gap from mere facts to usable knowledge (higher Bloom competencies). Faculty experiences also make good responses to student postings. And faculty experiences can be used to craft good

discussion questions. The effort required to compose and enter (type) these provides a natural governor to control the length and relevancy of these.

Case studies work exceptionally well with discussion questions. Cases can vary from a few sentences (vignette) describing a unique situation all the way to a 30 page description of an entire organization or industry. Responses often cover the range of Bloom competencies.

Instructor Involvement in Conferences

An issue related to designing discussion questions is the type and frequency of responses by the course instructor. A large study covering three semesters and 20 sections found an interesting correlation that the more an instructor participates, the less that students participate. (Mazzolini, 2003)

the percentage of instructor postings within a forum showed a significant negative correlation with the length of discussion threads ($N = 29$, $R = -0.67$, $p < 0.01$).

Students appeared to consider instructor postings as “the last word” on discussion threads. Interestingly and almost contradictory, the authors also found that student satisfaction and views of instructor enthusiasm were positively correlated with the percentage of instructor postings. Students comments did indicate that instructor involvement that consisted of questions, as opposed to answers, was favored by students but statistics were not available on the effect of this on thread length. Another variable not considered was how open-ended the original questions were and whether the questions required critical thinking. But there seems to be an optimal amount of interaction, rather than merely more is better.

Problems

Online education is a new paradigm for some students and problems do arise. Open ended and complex questions require extra effort and time for students. Late responders require students to backtrack to previous units which can be distracting and time consuming. Students who have done well in their undergraduate career via an approach of memorize and recite (Bloom’s knowledge competency only) can get highly frustrated. And they can not hide in a corner. Some students will write voluminous answers that frustrate other students, and are probably ignored. It usually is effective to post Pascal’s (1657) quote on short/long letters: “I have only made this [letter] longer because I have not had the time to make it shorter.”

Grading

Since active conference participation involves a substantial amount of effort, sufficient weight in the grading system must be allocated to it. In this author’s experience, approximately 30% of the total course grade seems to work well.

Creating, participating and revising discussion questions require substantial effort and time. Faculty time is not unlimited nor is extra time compensated. Therefore frequency of grading and comments concerning discussion grades is a difficult issue.

Some faculty assign conference grades each week, and others every three or four weeks. (In face-to-face, participation is often once or maybe twice a semester at most and often an arbitrary determination). It seems unreasonable and unnecessary to individually comment on grades assigned in conferences (an exception is inappropriate behavior).

The volume is too great. Rather, instructor comments are the postings they make within the conferences. These can tactfully help students (all students) understand where more depth or thought may be needed. Student reactions to their peer's postings also provide substantial feedback. Note that substantial grading comments are critical for student assignments, a different topic.

Continuous improvement

Continuous improvement is critical to the education process. This includes revisions to content, projects, exams, and especially discussion questions. The discussion question capability in an online environment provides hard data that particularly lends itself to continuous improvement of discussion questions. The quantity and quality of responses provides valuable information. One can review the postings to determine inadequate backgrounds to address questions, misconception in knowledge, new topic areas that need to be explored in the course, as well as poorly worded questions. Regarding the latter, it is inappropriate to blame the student when one sees several responses that missed the point that the instructor intended. This information is critical to the instructor and to students in later semesters. It works well to keep two sets of questions: this semesters and next semesters. As one reads or grades conference postings, changes or comments can be posted to next semester's questions.

The quantity and quality of responses must be considered together. Question that only prompt a few good responses are not necessarily bad if the other students learn from them or motivated by them to do additional research etc.. And some questions can lead to voluminous postings with no meaningful results.

Summary

Discussion questions are a critical aspect of online education and can often determine the difference between a positive student learning experience verses courses being a chore at best. While discussion questions are often the last task addressed in designing and teaching a course, they may be the first in importance. Hard research is needed on the effect of question composition on student participation and satisfaction. This could be performed by analyzing questions and discussion threads of multiple sections of courses. Good discussion questions enable students to simultaneously function as both teachers and students; probably the best learning facilitator. And this applies to faculty members as well as students.

APPENDIX A. BLOOM'S TAXONOMY

Competence	<i>Skills Demonstrated</i>
Knowledge	<ul style="list-style-type: none"> • observation and recall of information • knowledge of dates, events, places • knowledge of major ideas • mastery of subject matter • <i>Question Cues:</i> list, define, tell, describe, identify, show, label, collect, examine, tabulate, quote, name, who, when, where, etc.
Comprehension	<ul style="list-style-type: none"> • understanding information • grasp meaning • translate knowledge into new context • interpret facts, compare, contrast • order, group, infer causes • predict consequences • <i>Question Cues:</i> summarize, describe, interpret, contrast, predict, associate, distinguish, estimate, differentiate, discuss, extend
Application	<ul style="list-style-type: none"> • use information • use methods, concepts, theories in new situations • solve problems using required skills or knowledge • <i>Questions Cues:</i> apply, demonstrate, calculate, complete, illustrate, show, solve, examine, modify, relate, change, classify, experiment, discover

Analysis	<ul style="list-style-type: none"> • seeing patterns • organization of parts • recognition of hidden meanings • identification of components • <i>Question Cues:</i> analyze, separate, order, explain, connect, classify, arrange, divide, compare, select, explain, infer
Synthesis	<ul style="list-style-type: none"> • use old ideas to create new ones • generalize from given facts • relate knowledge from several areas • predict, draw conclusions • <i>Question Cues:</i> combine, integrate, modify, rearrange, substitute, plan, create, design, invent, what if?, compose, formulate, prepare, generalize, rewrite
Evaluation	<ul style="list-style-type: none"> • compare and discriminate between ideas • assess value of theories, presentations • make choices based on reasoned argument • verify value of evidence • recognize subjectivity • <i>Question Cues:</i> assess, decide, rank, grade, test, measure, recommend, convince, select, judge, explain, discriminate, support, conclude, compare, summarize

Bloom's Taxonomy. Learning Skills Program, 2005, University of Victoria, 7 Nov. 2006
<http://www.coun.uvic.ca/learn/program/hndouts/bloom.html> Adapted from Benjamin S. Bloom *Taxonomy of educational objectives*. Boston: Allyn and Bacon, 1984.

APPENDIX B: REVISED BLOOM'S TAXONOMY

The Revised Taxonomy of the Cognitive Domain (Anderson and Krathwohl, 2001)							
		1. Remember	2. Understand	3. Apply	4. Analyze	5. Evaluate	6. Create
		Retrieve relevant knowledge from long-term memory	Construct meaning from instructional messages, including oral, written, and graphic communication	Carry out or use a procedure in a given situation	Break material into constituent parts and determine how parts relate to each other and to an overall structure or purpose.	Make judgments based on criteria and standards	Put elements together to form a coherent or functional whole, reorganize elements into a new pattern or structure.
Factual Knowledge							
	The basic elements students must know to be acquainted with a discipline or solve problems in it.						
Conceptual Knowledge							
	The interrelationships among the basic elements with a larger structure that enable them to function together.						
Procedural Knowledge							
	How to do something, methods of inquiry, and criteria for using skills, algorithms, techniques, and methods.						
Meta-cognitive Knowledge							
	Knowledge of cognition in general as well as awareness and knowledge on one's own cognition.						

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