Searching for Socrates: How to Engage Online Students

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ABSTRACT

Our university enrolls over 500 students in its online Master of Business Administration (MBA) program. In this paper we present tools that were developed to better engage students with their online learning environment. Over 85% of our students reported that individually and collectively these tools were more effective in helping them to understand the material.

Keywords: Online Learning, Socratic Method, Case Method Based Learning, Pedagogy.

1. INTRODUCTION

At our institution, professors who teach an on-line course are required to have taught the same course face-to-face. This creates an implicit quality-control check for the on-line courses as they are being developed since the goal is to make the on-line courses the same as the face-to-face courses. We use the case method as well as interactive group learning in our face-to-face (f2f) classes. Thus, a challenge was to recreate the Socratic nature of the face-to-face sections in the online environment.

In this paper, we describe how we have measurably improved student learning by successfully integrating Socratic Inquiry, which is at the core of case based learning, with virtual learning environments. We describe a set of four "Socratic Method Implementation Tools (SMITs)" that were responsible for the success that we describe quantitatively by presenting the results of student surveys and qualitatively by a number of unsolicited comments received from students who have taken the course.

2. STUDENT LEARNING AND SOCRATIC INQUIRY

The course that we teach is quantitative in nature. Many quantitative courses are taught from an algorithmic point of view where the time is spent on students learning the steps required to achieve the solution to a mathematical or statistical problem, providing the mathematical rationale of why these steps adhere to established mathematical theories, and then demonstrating their mastery of the steps by applying them to a set of numbers supplied by the textbook and/or the instructor. The results of this approach are that students tend to perceive such courses as "theory" with little or no application to the real world.

As instructors with strong business backgrounds in decision making, we had rejected the above long before the advent of online teaching. We "evolved" from the above algorithmic approach by supplementing the "plug and chug" homework problems with comprehensive business problems (cases). We also began to shift the focus of our then f2f classes from presenting algorithms in class to discussing the cases from a business perspective and thus introducing Socratic Inquiry to enhance student learning. Our hope and expectation was that as a result of adopting Socratic Inquiry, compared to traditional learning methods, students would be better able to [1]:

- Relate ideas to previous knowledge and test theory against experience
- Look for patterns and underlying principles
- Check for evidence and relate it to conclusions
- Examine logic and arguments critically and question assumptions
- Acknowledge alternative perspectives and construct counterarguments
- Identify bias and generalizations
- Seek or provide clarification and build consensus through cooperation
- Employ active problem solving skills

Discussions support all these goals. Participants in a discussion should not compete to find the right answer, but rather collaborate in a process of evolution and development. While a discussion may converge on a consensus, it may also lead to divergent conclusions that yield a deeper understanding of the topic [1]. This goal of deeper understanding, which is an advantage in the social sciences and a problem for science/math courses, matches perfectly with the multi-criteria nature of business cases. Mathematically, a single criterion leads to a single optimal solution. But, multiple criteria conflict with one another, requiring tradeoffs between the criteria that can be developed and understood in the course of a Socratic discussion. We present our approaches to facilitator/instructor involvement that can serve to lead discussion toward the understanding of the tradeoffs of the multi-criteria problems.

3. BLENDING SOCRATIC INQUIRY, ONLINE LEARNING, AND QUANTITATIVE SUBJECT MATTER

As is true with many efforts, our first attempts at a case-based/on-line quantitative class weren't all that effective. We had each, separately, moved to using cases to switch the focus from memorization to application of the tools to problems. When our Dean mandated that the course go on-line and provided financial incentives for faculty who elected to teach in that format, we each, again separately, developed our own approaches to asynchronously providing the lecture material. That asynchronous material, when presented to the f2f students,

made the lectures unnecessary. So, class time became devoted to working on the cases. This, in turn, led us each, by different though parallel paths, to Socratic Inquiry. Originally, the on-line classes lagged behind the f2f sections. But, with the f2f experience to guide us, and the desire to provide our on-line students just as rigorous a course as our f2f students, we found ways to bring the quality of the on-line classes to at least the level of the f2f classes.

We have striven to maintain the learning synergies associated with using Socratic Inquiry, or collaborative case studies, in our quantitative course while "porting" the course from a f2f format to an online format. We have accomplished this by understanding the relationships and issues between each combination of these ingredients as we discuss in the following sections.

Quantitative Material and Online Courses

One inherent and inescapable characteristic of a quantitative course is that it teaches the uses of tools to solve a variety of business problems. Invariably, the use of linear programming, simulation, and decision theory is demonstrated using appropriate software (in our course, we use Microsoft Excel which provides the additional bonus of increasing our MBA's capabilities with this important tool). Even those most critical of the pedagogical value of online learning grudgingly admit that online education is best suited for "rudimentary" courses in basic accounting or finance, or for that matter, quantitative techniques.

It is taking the quantitative class to the next level, applying the techniques to case problems and having the students analyze those problems, particularly in using Socratic Inquiry approaches, that we have defied conventional wisdom. Fortunately for us, perhaps, we didn't realize that Socratic Inquiry in on-line courses was deemed to be impossible. So, we just went ahead and made it work.

Socratic Inquiry and the Quantitative Course

Our quantitative course is devoted to the task of data analysis with the goal of improving decision making. Decision making can be simple (flipping a coin will make a decision). But, the analysis of data in a multi-criteria setting requires training to reach a decision that you can defend. Decision making, considered as a skill, is a difficult thing to teach and every aspect of the course should be directed to encouraging the student to be a better decision maker.

A case-based approach to our class is a natural result of the need to move the class beyond memorization of calculations and toward applications that lead to better decision making. This requires interaction between the professor and students and, as part of the case, the students are required to implement the decision science tools to make (and defend) decisions. Rather than simple calculations to reach a "correct" decision, the cases can present multiple, conflicting criteria for the students to consider. Calculations help the students grasp the problem setting, but ultimately the student must rely on his/her judgment to select the preferred alternative. Lecturing is insufficient (though still a useful technique) to get students to work the cases. So, adding the teaching technique of Socratic Inquiry (engaging the students in conversations as well as lecturing) can enhance the use of cases.

Socratic Inquiry in On-Line Courses

Herein lies the real problem: cases certainly can enhance quantitative courses and Socratic Inquiry certainly makes cases more effective. But, the asynchronous nature of on-line teaching makes the give-and-take of Socratic Inquiry within an on-line class difficult to reproduce. What we have found, however, is that if you do not rigidly adhere to a "pure" model of either Socratic Inquiry or asynchronous teaching, the combination works quite well.

Although the concern of many faculty and administrators is that the implementation of the Socratic Method (e.g. on-line discussion) cannot produce the same learning outcomes as a f2f environment, online discussions have one key advantage in that they make the Socratic method scaleable by facilitating its implicit reciprocity and inquiry [1]. Face to face discussions, by their nature, require immediate presence, which can introduce inhibiting factors to the discussion. Online discussions, on the other hand:

- Overcome barriers of time and space
- Provide a risk-free environment that encourages a frank exchange
- Minimize the potential for confrontation
- Neutralize status indicators and social distractors
- Broaden the range of feedback by incorporating peer-to-peer exchange

For the above advantages to be realized, facilitators/instructors should take care to ensure that the online discussions create a space and time for informal, reflective thought and that facilitation is focused less on frequency and more on purpose, continually provoking students with selectively spaced, neutral, probing questions [2].

Based on the above, we concluded that certain aspects of our course lend themselves well to online learning, albeit not to Socratic Inquiry. We can also conclude that the advantages of Socratic Inquiry are that students learn better from each other with a "guide by the side" than from a "sage on stage." They also learn useful critical thinking and higher order cognitive skills from Socratic Inquiry skills. However, the downsides are that, in a Socratic Inquiry environment, there are opportunities for less than full participation and it is easy for discussions to get off track. This creates pressure on the instructor to cover the material in the limited time available which can be easier done by resorting to traditional lecturing.

In order to make sense of this cauldron of pros and cons, we developed a set of "Socratic Method Implementation Tools" that, when used together, yielded a near perfect blend that improved learning for over 85% of our students.

4. THE "SOCRATIC METHOD IMPLEMENTATION TOOLS (SMIT)"

The tools that we used are technology tools for course management and for synchronous and asynchronous collaboration. More importantly, our success is based on how we encouraged students to interact and collaborate. These "hows" are what we refer to as SMIT. However, they require appropriate technology for their implementation.

Technologies Used

The course management system that is standard for our university is Blackboard. The most used tools from Blackboard that were used by the instructors were the Discussion Board, Groups, Email, and the Grade Center. However, Blackboard's assessment tools including tests, Surveys and Pools were also extensively used. Students were given full access to Blackboard and were allowed any tools that they wished.

TechSmith's Camtasia Studio was widely used as a means to provide asynchronous learning materials, primarily lectures on specific technical topics that were recorded in f2f sections of the same or similar classes. For synchronous communications we made extensive use of SabaMeeting. The recording feature of SabaMeeting was useful to provide materials recorded in a synchronous session to those who were not able to attend. Students were allowed to use any technologies they wished for collaboration among themselves and many used Skype and GoToMeeting.

Armed with the above technologies, students became involved with the subject matter of the course as described below.

SMIT # 1 – "Socratic" Lecture Notes

Teaching decision making is a natural fit for the Socratic Method since most if not all real life problems are viewed differently by the analyst, the manager, and the user and, thus, have multiple criteria associated with them. Since almost anything improves with practice, it makes sense to get students involved with decision making and Socratic Inquiry in every aspect of the course. Socrates developed this approach to force his students to think and, three thousand years later, we're still trying to accomplish the same goal. Involving students in discussions concerning some problem allows them to consider all aspects of the problem, such as how a proposed solution will affect all aspects of the business. Rather than telling the students what to do (lecturing), the discussion forces the student to evaluate their proposed solutions under many possible futures. This is thinking like a manager, rather than like a mathematician.

Starting these discussions can be difficult, as many students are not prepared for the use of Socratic Inquiry in the classroom. Most students have received a standard, lecture-based education, where the teacher talked and the students listened (maybe) - a passive learning situation. Effective teaching of decision making requires an active learning approach, with which the students may be uncomfortable. To make the students more familiar with the Socratic/active learning system, they can be introduced to it right from the start with the lecture notes for the course material that mimic the Socratic Method.

A traditional text follows the format of a class lecture: the student is told what to do, how to do it, an example may be presented, and then a problem is assigned. This is an excellent approach for communicating instructions – telling the student how to do something. Lecture notes in a Socratic Inquiry format will do much the same thing for the portion that deals with giving instructions. Where lecture notes that mimic the Socratic Method will be different is in teaching the student how to use the instructions (calculations) to perform an analysis.

Any Decision Science textbook can provide instructions for setting up a payoff table and calculating the rules for such a table. An example of such instructions in an SI format is shown below, where a "Q" indicates a question, an "A" an answer, and a "D" discussion that elaborates on the answer:

Q: What's the first decision rule?
A: An optimistic one.
D: If we are optimistic, we look at only the best outcome for each alternative (without worrying about which futures we are talking about). This rule is also called Maxi-Max, or Best of the Best, and I prefer the latter because it tells you what to do. For each alternative, simply pick the highest profit (of course, if we were working with costs it would be the lowest cost) in that row. From among those best numbers, indicate the overall best (√), then the overall worst (×). I also chose to indicate the second place finish (*), which happens to be a tie. By itself, this rule doesn't tell us enough to make a decision, but it is a start.

Figure 1: Example of Q&A Format

Even in this simple example, the SI format has advantages. The question/answer format automatically provides an outline (when combined with other sections) of the material, helping the student to organize the information. The "Discussion" section can be used, or that section can be broken down into a further sequence of questions-and-answers. The discussion section may be preferred just for space reasons (the Q&A can fill up a lot of pages very quickly) but should be limited to providing calculations or straightforward information.

Obviously, the remaining calculations would receive similar treatment. A difference occurs when you move beyond the simple calculations and begin teaching what to do with the information you have. Thus, as the notes progress, the student asks a series of questions where the answers teach the student how to use the two rules to develop new information. For this reason, the questions are marked as "QS," meaning "Question from Student." To indicate a question from the instructor, simply use "Q" or the more precise "QI." The value of the SI format is easy to see. First, it can be nearly impossible to get students to ask questions, but since the instructor controls the creation of the lecture notes, the questions are posed as needed. Further, not only is the information outlined for the student, but it is fed to the student in small pieces, which are easier to absorb. In addition, major points receive their own questions highlighting that they are important.

In these notes, the hypothetical student always asks the right questions and never goes off on tangents that you don't have time for. In that sense, writing these notes is akin to writing a play (albeit a very boring one) rather than having a true conversation (where your partner often fails to live up to his/her side of the discussion). Even so, while authoring these notes, it is a serious temptation to fall back into lecturing (too many "Discussion" sections). We would not be in this business if we did not love the sounds of our own voices, so the process of turning control over to the students (even in writing) is difficult. The discipline to do this, however, pays off dramatically. By reading these lecture notes, students tend to become vicariously involved in the "play." This sets the stage for them to get involved in discussion by asking questions when it is time for them to start learning actual quantitative tools.

SMIT # 2 – Asynchronous Lectures

The Socratic lecture notes serve to develop an inquisitive attitude in our students. However, they also serve to teach those basic quantitative techniques which have become common tools for improving business performance and shareholder value in organizations worldwide [3]. To complement what is presented in the Socratic lecture notes, we have also posted a set of video lectures recorded using TechSmith's Camtasia Studio in live f2f sessions of the same or similar courses.

For learning the quantitative tools, the course's Blackboard site is organized in the following manner for each topic to be learned:

1. A reading containing the Socratic Notes described above that serves as the equivalent of a textbook chapter covering the material contained in the session.
2. A spreadsheet containing an example problem that will be the subject of the session's Camtasia video-lecture (Camtasia is the name of the software that is used to prepare the video-lecture).
3. A Camtasia video lecture that uses the example problem as a vehicle to explain the subject matter. Note that the video can be fast forwarded or reversed so that you can view any part as many times as you wish.
4. The final spreadsheet that was developed during the video lecture. This is a "live" spreadsheet that you can manipulate and examine the numerical and formula content of all cells.
5. There may be several folders that repeat steps 2-4 above using a different example each time. It may take several examples for the subject matter to finally "click."

Students are advised that they cannot learn this material by watching videos or reading files. They must actually work the problems. They are also told that a good indication that they have learned the material they is that if they can take the Excel problem worksheet that will be worked in Camtasia and work it out without having to refer to the video or the reading material. They are also encouraged to (and do) use the Discussion Board to post questions and/or answers, or make comments about the material that they are learning.

SMIT # 3 – Advance Collaboration on Complex Problems

The major challenge we face is to engage students in meaningful interaction that leads to discovery –e.g. Socratic Inquiry. By providing lecture notes in a Socratic Inquiry format, we have introduced the desired thought process to our students while *simultaneously* managing to keep on schedule to cover the required core material of the course. But, the price has been to give up free SI for scripted SI. To overcome this shortcoming, we have provided an opportunity for engaging our students to the real thing - true SI – by using the cases accompanied by the strongest incentive we know to do so, a chance to improve their grades.

We are using the cases in two ways. The first is a traditional setting, where the case is provided to the students, they have a certain amount of time to analyze the case, make a decision, and communicate that decision (full paper, summary paper, or presentation). The students are assigned to groups to work on the cases, and are graded on whatever is turned in. In addition, the groups that are not presenting the cases are required to prepare questions that challenge the presenters (the non-presenters are graded on the quality of their questions, just as the presenters are graded on the quality of their responses). As a variant on this, students may work a case individually and prepare a presentation, which in turn generates discussion about the results.

A second way we are using cases, and one that pushes the students, is by providing students with an advance copy of a complex problem/case study that must be correctly formulated *and* run on Excel using the appropriate add-ins (e.g. data analysis, solver) prior to a scheduled examination – typically scheduled at least a work week after the problem is made available. Students may collaborate in any fashion to arrive at what *they* think is the correct formulation.

The examination itself consists of randomly selected questions from a case related question bank covering all aspects of the solution which cannot be answered correctly unless the formulation and solution are correct. Students are given the opportunity to interact without restrictions in their effort to obtain a correct solution prior to exam time (However, the instructor is not available to answer questions on the problem/case study). We try to make the problem complex enough so that even the best students are motivated to enter into a discussion regarding their approach and results, while the other students are, by necessity, motivated to question what appears on the discussion board so that they can understand it well enough to perform on the exam. True to the Socratic Method, it is possible for all students to have agreed on a wrong solution to the problem (which in qualitative classes may simply mean that there is an alternative truth) and the overall performance of the class is dismal. Such mass disasters are not very common. A more common scenario is that self-selected subgroups agree to disagree on the solution with those that are correct performing better on the exam than those that do not. Even for those who have the correct pre-exam solution, performing well on the exam requires correct interpretation and manipulation of the solution which is rarely accomplished. Thus, exam grades are rarely what students expect.

SMIT # 4 – Closing the "Socratic" Loop

Naturally, a disappointing performance causes great stress to students, but provides us as instructors with a great opportunity to complete the "Socratic Loop" from beginning discussion to the discovery of truth (the correct formulation and solution). We close the Socratic Loop by giving students the opportunity to see their answers to the exam questions as well as the correct answers. They then are given the opportunity to retake the exam after they have had time to reconsider their original formulation/solution to the exam problem. Such a retake is a valid pedagogical step since all questions about the problem solution are randomly generated from a question bank. Thus, no student received the same exam as another and a student's original exam and their second exam are not the same. However, the random nature of the selection of exam questions does allow for the possibility of some questions being repeated.

One measure of success in fostering Socratic Inquiry is the number of posts that are placed on the course's discussion board. During the Spring Semester, a class of 26 MBA students had three exams. They posted 199 questions and answers prior to exam 1, 233 prior to exam 2, and 142 prior to exam 3. Alternatively, monitoring participation in the case presentations shows a near 100% attendance and, if you consider that the presentations are recorded and can be viewed at a later date, the

attendance is an effective 100%. A majority of students wrote in their course evaluations that they learned more in this SI course than any other course in their MBA program. However, such feedback is anecdotal so we decided to conduct a more formal survey to assess the impact of the SMIT's on student learning.

5. RESULTS

In this paper, we have asserted that by integrating Socratic Inquiry with virtual learning environments, we have measurably improved student learning. To test this assertion, we have taken what [1] reports to be the abilities that students will develop as a result of the Socratic Method being used in a traditional environment, as the criteria by which student learning can be assessed. These are (repeated from earlier in this paper):

- Relate ideas to previous knowledge and test theory against experience
- Look for patterns and underlying principles
- Check for evidence and relate it to conclusions
- Examine logic and arguments critically and question assumptions
- Acknowledge alternative perspectives and construct counterarguments
- Identify bias and generalizations
- Seek or provide clarification and build consensus through cooperation
- Employ active problem solving skills

We developed a questionnaire asking how each of our SMIT's contributed to achieving each of the above. We also added the following as a ninth question "This SMIT was more effective in helping you to understand the material (than what is typically provided in other courses)." We used this question to get a "bottom line" result regarding the use of the tools. If a tool did not facilitate a student to learn the material, then what good is it?

The questionnaire was administered to our students for two consecutive semesters. The responses to the questions were on a seven point Likert scale (Much more effective; More effective; Somewhat more effective; Neither more or less effective; Somewhat less effective; Less effective; or, Much less effective). The positive responses (e.g. the cumulative responses for the top three Likert scale options: "Much more effective; More effective; Somewhat more effective") were calculated and the results are summarized below:

1. Compared to a traditional text book, do you feel that the lecture notes provided in this course: (81%, 89%)
2. Compared to a traditional lecture, do you feel that the Camtasia video lectures provided in this course: (85%, 93%)
3. Compared to typical examination methods, do you feel that providing the exam ahead of time and allowing collaboration as was done in this course: (92%, 100%)
4. Compared to a single attempt at writing a report or taking an exam, do you feel that being allowed to rewrite the report or retake the exam after you had seen your performance on the report/exam, as was done in this course: (88%, 96%)
5. Coming as the last component of the course after you learned some of the Decision Science tools, do you feel that these presentations (of case studies): (100%, 85%)

Qualitative Results

No innovation in teaching ever gets a unanimous vote of support, but students generally have responded well to the implementation of the Socratic Method in our classes. Besides responding to the specific questions, the students had the opportunity to provide unscripted statements. Without exception, these comments were highly complementary of our approach and many commented that this was the best learning they experienced in their program of study.

5. CONCLUSIONS

The concept of involving students in a discussion, rather than lecturing them, is not new. Neither is case-based teaching, nor trying to get students involved in classroom discussions. On-line teaching has made much of this even more difficult as the asynchronous nature of on-line course rather inhibits conversations. Designing the lecture notes, which the on-line students use, to teach (by example) the interaction between teachers and students can only help the on-line students adapt to this approach. Creating a situation where their natural inclination (to do well on a test) encourages them to get involved with the discussions reinforces the goal of the course. Finally, closing the learning circle, by allowing the students to re-take exams after discussion about exam cases, solidifies the process in the minds of the students. Conventional wisdom tells us that on-line courses should be restricted to basic material. In this paper we have shown that if the professor is willing to make the effort, and students are motivated to participate, then even quantitative courses can be successfully taught on-line, using a Socratic Inquiry format.

6. REFERENCES

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