

Improving the Socratic Method of Teaching Through the Use of Interactive Lecture Experiences

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Abstract

It has been said that the most effective teachers use class time to help students think about information and ideas the way scholars in the discipline do. To this end, some use a Socratic Method to facilitate deeper thinking during class time. The implementation of a Socratic education model seeks to increase cooperative argumentative dialogue between individuals through the asking and answering of questions to stimulate critical thinking. Unfortunately, teachers are in constant competition with distractions face by students in the classroom. Increasingly, these distractions come from electronic devices. The purpose of this paper is to demonstrate how interactive lecture experiences can improve the Socratic method of teaching. This may be accomplished through the electronic devices that ironically often act as detractors from learning. This study reports the positive benefits that can be gained from the use of real time, electronic, interactive questioning in the classroom. However, it will also provide the disadvantages of opening the classroom to the use of these tools. Topics such as passive and active learning, virtual discussion boards, anonymous instant feedback, and in-class electronic testing will be discussed. Outcomes of these interactive lecture experiences from use in actual classroom and workshop settings will be given. This study adds to the body of knowledge by giving real solutions to challenges faced by teachers confronted with distracted and disengaged students. The findings of this study will help teachers improve the way they engage students, assess learning, and improve presentation of class materials. This paper also serves as an example of how interactive polling software can be used to enhance classroom discussion.

Keywords

Socratic Method, Interactive Polling, Blooms Taxonomy

Introduction

The Socratic method of teaching has been around as long as there have been teachers to teach. Modeled after the philosopher Socrates, this method focuses on providing the student with questions, not answers. Ability is then gained through a focus on reasoning and disciplined thought (Paul et al. 1997). Over the years this method of learning has change very little, a Socratic questioner would seek to keep a focused discussion that is intellectually responsible using probing questions, periotic summaries, identification of what has not been discussed; all while trying to draw as many students as possible into the discussions (1997). “In a twenty-first-century classroom, no one person should ever be in control. The learning space should be one of inclusive ideas, inviting all parties to bring something valuable to the conversation. Once the

culture for learning is established, the teacher's role is more of facilitator rather than 'sage on the stage,' blending in more readily with the learning that is happening in the classroom." (Sackstein 2015).

One twenty-first century issue that a teacher must deal with is the issue of technology. Students have an increasing amount of access to the distractions of technology. It becomes the challenge of the twenty-first century teacher to either embrace technology or fight against it. This research study was performed to look at one possible way to embrace the use of technology in the classroom and use it as a tool to improve the Socratic method of teaching. The theory is that: "Technology is a necessary friend and tool to these explorers of new learning. Teachers shouldn't fear it, but rather embrace it and meet students where they are. Students of the twenty-first-century require flexible environments with ever growing capacities." (Sackstein 2015). This paper discusses some of the observed advantages and disadvantages of using a technology enhanced interactive lecture experience in the classroom.

Methodology

This paper follows the use of interactive questioning using technology in three settings; the first is in a school classroom of over 40 students, the second a training session of over 50 industry professionals, and the third is a small training session of 10 individuals. The observations of advantages and disadvantages involved with using this method may change among the studied groups. In all three cases the software used in the interactive questioning was Poll Everywhere. Multiple interactive questioning tools exist, each with differing costs and capabilities. Poll Everywhere was used because it meets the most basic functions of interactive questioning and using the basic program is free of cost. Interactive questioning allows for the instructor to project an image or question on the screen and have students interact with that image through the use of a basic cell phone, a smart phone, tablet, or laptop computer. The interaction engages the audience or classroom in real time with continuous updates to the screen.

The findings of the study are mostly observational; therefore, a qualitative method of analysis was used. However, there are a few quantitative methods used; one of the findings of this study is that it is simple to collect data from the study group using these interactive questioning tools. This data was then used to make basic quantitative observations. Descriptive statistics, however, are missing from the data set. For this circumstance inferential techniques are used to come to conclusions about the population (Vogt 2007).

Findings

In general, it was observed that the use of interactive questioning using the polling software Poll Everywhere was very effective. The authors feel it improved the environment of teaching by improving the aims of the Socratic method. Namely, keeping a focused discussion that is intellectually responsible using probing questions, showing the level of understanding in the group with questions and periodic summaries, identifying what is not fully understood, and drawing as many students as possible into the discussions. There were obvious advantages to using this method of interaction, but along with these there were disadvantages identified as well.

The level and effectiveness of class room interaction was effected by the effectiveness of the questions being asked. Blooms Taxonomy is often used to develop questions that improve learning objectives (Bloom 1956, Anderson et al. 2001). Questions can be asked at a most basic level where the end objective is an ability to recall a specific answer. Figure 1 gives an example of the level questions in Blooms Taxonomy. Questions to the three groups used in the study were often at the most basic level. They were questions used to determine if the group understood a certain concept. This was useful in that the instructor could assess the current level of understanding and adjust the teaching according to what was needed. It did not, however, lead to in-depth discussions and what would be considered deeper learning brought about by analyzing, evaluating and creating as demonstrated in Figure 1.

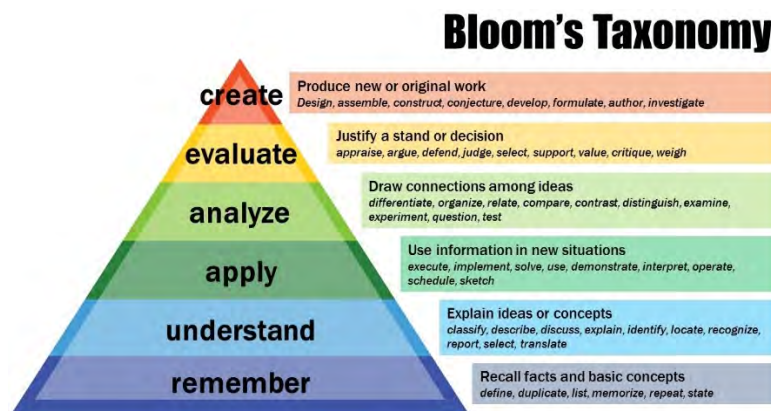


Figure 1. Blooms Taxonomy Image from: Patricia Armstrong, Center for teaching, Vanderbilt University

An example of how interactive questioning can guide the direction of the discussion is the use of an introductory or gateway question. In each of the classroom settings participants were asked to answer a self-assessment question. The question in this case was: “How would you rate your understanding of CPM scheduling?” The results were shown on the screen in real time and a general feeling of how the group felt they understood the topic was observed. This was unanimous so students didn’t feel pressured to answer a specific way. After the gateway question, a question demonstrating a level of understanding was provided. In this case students were asked to identify the number of float days that could be used by an activity. A CPM schedule was provided which would give anyone with experience in CPM scheduling the ability to answer the question easily. The right answer was then provided. What was interesting to note was the level of confidence among the groups questioned. The small group of industry professionals rated themselves fairly low in their understanding of CPM scheduling. The results to the basic question also showed that they did in fact need a refresher in CPM. It should be noted that it was the purpose of this group to receive CPM training. The group of university students showed a moderate understanding of CPM in their self-assessment; this was met by a greater percentage of participants that were able to answer the follow up questions correctly. The large group of industry professionals rated their understanding of CPM as very high, but in contrast, not a single individual was able to answer the follow-up question correctly. The instructor was then able to teach according to the level of need, and the students became more self-aware of their own ability.

Another example of using questioning to assess the level of understanding can be seen in Figure 2. Here instruction had just been given as to how the view through an auto level could be used to estimate the distance of rod being read. The students were asked to indicate how far away the rod was by clicking on an image on their smart phones, tablets or PC computers. Their answers were hidden until all had indicated and the image in Figure 2 then showed the answers. Both the students and the teachers could immediately identify how well the student understood this concept. This guided the direction teaching, further questions, and discussion needed.

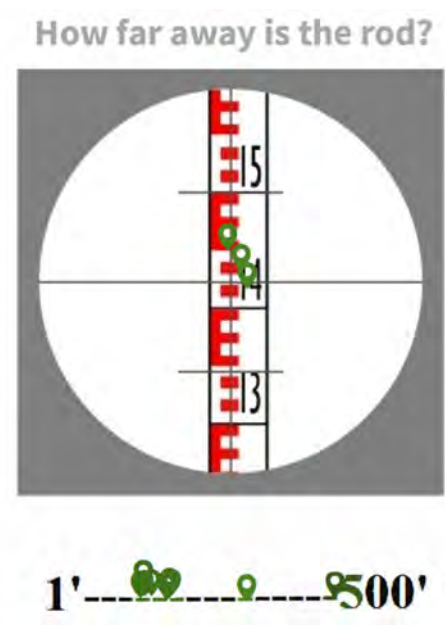


Figure 2. Reading a Level Rod

One benefit of using interactive questioning is the creation of visual content specific to the individuals currently in the classroom. In each of the classroom settings the question was asked: “What is the purpose of a schedule?” The students could then type in an answer and this would be automatically populated on the screen. There are many options for how this could be populated. In Figure 3, a word cloud was used. Using this method, there is an automatic visual that can facilitate the beginning of an in-depth discussion of the topic. In the example of the word cloud, a limitation would be that the visual only populates one word, and its size in the visual is based on the number of times it is submitted by the students. When using this type of questioning a word cloud may be best when you ask participants to use one word to describe something.

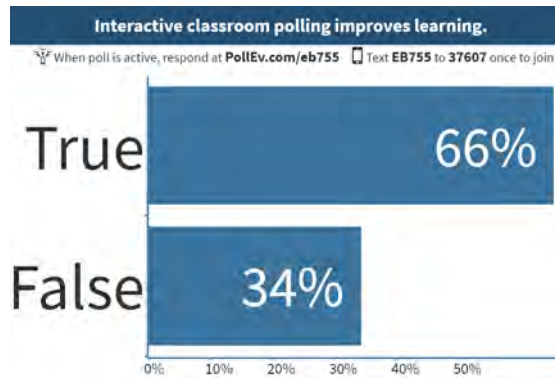


Figure 5. Improved Learning (sample size 102)

When asked about the advantages of using interactive questioning, the participants responded with a variety of observations. Table 1 provides the identified advantages along with the response rate. In this case, students can add their own response or vote on the response of others if they agree with what another student has written. This type of questioning and response allows can allow for improved interaction with students and can be helpful in identifying where the discussion could go. A teacher could ask a question such as “What topic would you like to review today?” Students could then begin to list topics they need help on or vote for topics that others identified. The topic with the highest priority could then be selected for further discussion.

Table 1. What advantages do you see to using interactive polling in a lecture?

Response rate	Response
7	Fun!
6	Not afraid to make mistakes
5	I can steal my answer
5	It keeps my mind stimulated and engaged
5	Attention grabber
5	Each person is engaged, unlike a discussion where only one person can talk at a time.
4	Everyone can work out problems
4	Answers can be biased to what everyone else says
4	Funny responses
4	Fun to interact
4	It encourages participation and engagement in the questions
4	Very involved
4	I don't fall asleep
4	More interaction
3	I get a chance to work the problem out myself first
3	I can see how well I understand the problem compared to other students
2	I have to think
1	Teacher can know who has an idea of what is happening in class

In addition to the advantages noted above, the participants also identified disadvantages to using interactive questioning. Table 2 identifies some of the disadvantages. One of the most obvious disadvantages was that students could write whatever they want. Evidence of this can be seen in the responses given such as “Bingham is the man!” and “YOU CAN WriTE Whatever YOU WAAAAAANNNNNNNNNTTTTTT.” Participants are not held personally responsible for their answers and this could lead to some potentially embarrassing moments. Although there are ways to reduce this type of feedback through the use of a monitor that approves the postings; it adds one more thing to worry about. Answers used in this format are associated with a specific student; however, the more advanced software platforms do allow for tracing of responses by participant and even grading based on the response.

Table 2. What Disadvantages do you see to using interactive polling in a lecture?

Response rate	Response
9	Bingham is the man!
6	It is hard to take it seriously, especially when your answers are not graded
3	People are anonymous so they act dumb
3	YOU CANT WriTE Whatever YOU WAAAAAANNNNNNNNNTTTTTT
3	Limited time to think of the answers
2	You can fall behind
2	My phone does not work
2	Low battery
2	Easy to slack off
2	You can steal answers
2	Easily Distracted
1	It drives the speed of the lecture
1	Technical difficulties

Some top disadvantages of using interactive polling, is the idea that if questions are unanimous, there is no incentive to take it seriously. With the three groups tested in this study, each used the questions as a sounding board for jokes or funny comments. Even in the most professional environment of industry professionals, the interactive lecture was often derailed by off topic comments or answers. Users of these technologies need to be aware of this issue and manage the amount of distractions they allow. This could be done by establishing early the culture of the learning environment, through monitoring by TA or helper, or using software that identifies the participant and creates accountability. In any case, feedback from class participants can be helpful in assessing the amount of learning that is taking place.

In a classroom traditionally run as a lecture, one of the authors of this paper dedicated the whole class period to interactive questioning. This was used to assess understanding of some difficult mathematics problems, identify and teach in the areas needed, and observe the learning experience. Figure 6 gives a summary from the students’ view in this lecture. The word cloud gives insight into some of the advantages and disadvantages of using the interactive questioning in a classroom setting. As shown in the figure, classroom feedback is mixed with most student

feeling the lecture was something like “engaging” or “interactive” while a minority of students felt it was more “monotonous” or “confusing”.



Figure 6. Insight into Interactive Lecture

Conclusions

The Socratic method of teaching will continue to be used as an effective tool for learning. It involves the use of questions to facilitate learning discussions. This study has been an observation of using the technology that often leads to distraction in the classroom as a tool to improve learning through the Socratic method. The use of interactive questioning using technology was observed to have some advantages and some disadvantages. It was found that using higher levels of questioning as demonstrated in Blooms Taxonomy could lead to improved discussion through interactive questioning. This study also found that the culture of the classroom needs to be managed in order to reduce the distractions caused by off topic or comical remarks that can result from the open questioning format. The use of software to allow for these virtual discussion boards does improve the number of class participants and has the ability to improve quality of discussion. It can be a worthwhile tool used to guide the instructor in the most needed direction to assess learning or collect real-time data and feedback from students. Using interactive questioning is viewed positively by the majority of participants and can have a great ability to improve learning. Further research may be needed to determine the most effective ways to implement the technologies of interactive learning to have the greatest effect in the classroom.

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