

Methods for Learning Ethics Material: What do Learners Prefer?

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Abstract

Recently, 11 students taking a course in systems development at a small, private, liberal arts college in the Midwest were given the opportunity to apply three methods for learning ethics material as it relates to the study of computer science: structured controversy, dramatic presentation, and a research paper. The students were divided up into appropriately sized teams and gave presentations to the class as well as a group of visiting students from a senior seminar course.

Each method was evaluated by the learners; the participating learners for each method dealt with a slightly different set of questions than those who observed. The learners received each of the methods reasonably well, but showed definite preferences for structured controversy. These results were further confirmed by instructor comments based on observation of each presentation. Each of the methods is briefly outlined in this study, along with some suggestions to make each successful.

Introduction

Undergraduate computer science educators often have difficulty finding appropriate ways to present ethics and professionalism within their curriculum. A number of important issues must be considered. Is it appropriate to integrate the material throughout the curriculum, or should there be a dedicated course? If the integrated approach is chosen, what can the department do to ensure that the material is being adequately presented? Are there appropriate instructional tools available to facilitate effective delivery of the material?

The roadblocks are many. Studies have indicated that instructors are reluctant for a variety of reasons; they are unfamiliar or uncomfortable with traditional methods for teaching/learning this material (Bear, 1986; Cunningham, 1986; Searls 1988), they assume that learning ethics will somehow be a natural consequence of learning computing, or they are simply reluctant to teach “values.” It is easy to push this material into the margins of the computer science curriculum (i.e., we’d cover ethics, but we need to spend more time on dynamic memory allocation) or to assume that it is covered in

other courses (e.g., an ethics course taken from the philosophy department as part of the general education program).

The computer science community is now at a stage where it can ill-afford to allow this trend to continue (Appel, 1998). The last three sets of curriculum guidelines from the ACM (Austing et al., 1979; Roberts & Engel, 2001; Tucker 1991) have demonstrated an increased emphasis of the importance of including material related to ethics and professionalism in the undergraduate curriculum. Studies show that employers desire (even demand) a high level of professional integrity from their prospective employees. Still, some will argue that none of this is convincing evidence that this material must be part of the computer science curriculum; the basic assumption seems to be that undergraduate learners naturally mature through the process of their education.

The Problem

A recent work completed by this researcher (Bohy, 2003) provides evidence to the contrary. Undergraduate computer science majors at four small, private, liberal arts colleges in the Midwest were surveyed regarding their attitudes toward academic honesty and their understanding of professional ethics. The survey came in two parts. In the first part, the participants indicated whether or not they agreed or disagreed with statements relative to academic honesty and its relationship to professional ethics (Adair & Linderman, 1985). In the second part, the participants were asked to consider six scenarios involving different areas of ethical conflict within the computing field (Parker, 1979).

There were no significant differences found among the experience levels (i.e., freshman, sophomore, junior, and senior) in terms of academic honesty and its relationship to professional ethics. The same is not true with regard to the ability of each group to appropriately identify various acts as being ethical or unethical. In particular, the data presented a rather disturbing pattern: freshmen did a better job of both correctly identifying a given act as being unethical and of supporting their rating with an appropriate argument. Moreover, both the ability to correctly identify acts and to support the identification got worse as students became more experienced. There was a slight rebound in the seniors, but they were still well below the freshmen (Bohy, 2003).

A number of possible factors were suggested by this researcher as possible explanations for this phenomenon. It could be that “senioritis” was a factor. This “condition” takes place in the senior year, and is a term used for those who are taking their school work less seriously. As such, it is possible that the more experienced students were not taking the survey seriously either. Or it may be that the older students were more detached from the material; perhaps they experienced the bulk of their exposure to ethics material early in the curriculum (e.g. CS1), and have since let it slide. Or perhaps these individuals are just anxious to get out and “do” computer science rather than just sitting around and talking about it (Bohy, 2003).

One important factor that was not accounted for is that of engagement with the material. Even if ethics is being incorporated into the curriculum in some fashion, it is not clear that the students are being made to apply it in any way. It is easy to find corollaries in other areas of CS. For example, simply telling students about linked lists is not enough. They have to write programs which use them; in particular they have to somehow “mess up” with dynamic allocation of memory to see what the consequences of doing so might be. To a great extent, the same is true of ethics. It is important to talk about ethics, but instructors must also be prepared to model the material as much as possible and to have activities which engaged the learners.

Pedagogical alternatives

The purpose of this study is to present three activities which do engage the learners (at different levels) with the study of social, moral, and ethical issues as they related to computer science. Further, the goal is to provide some insight as to the activities that most engage the learners. Others have written on the subject (Bohy, 1993; Schulze & Grodzinsky, 1996; Searls, 1988; Troutner, 1986), and have offered a litany of pedagogical methods. The bulk of these works, however, is taken up in describing the methods or in offering more or less anecdotal evidence of their effectiveness from the perspective of the instructor. The purpose here is to offer insight into methods from the perspective of the learners.

According to Johnson and Johnson (1988) the main goal of any instructional method is for students to derive conclusions about whatever topic is being studied through categorization and organization of the students’ information and experiences. There are a variety of both individualistic and team methods that will accomplish these goals in the context of ethics instruction in computer science. That all of the methods considered here are team methods is not an accident. Johnson and Johnson (1988) advocate for methods that develop professional skills (e.g. communication and argumentation) as well as have the effect of potentially changing attitudes toward these issues (in particular, they believe that team methods best accomplish this task). These skills, along with the ability to work in teams are rated highly by potential employers (Engel & Shackelford, 2001).

Position Paper

Of the three methods used in this study, the position paper is likely the one that most computer science educators are familiar with. Using it as a group activity is not unheard of, though also not terribly common. The primary advantage of using groups is that broader topics can be selected; individual members of the group can each research some aspect of the topic, thus in some way assuring that all contribute to the project. Such a paper will also encourage greater communication among the group members; they must keep in mind that the goal is to have a unified position.

For this study, a group of three students was asked to write a position paper on the subject of product liability. Their primary objective was to devise an informed position on the

issue and sub-issues related to it (if they found any). There were no particular demands made regarding the learners eliminating their own bias in doing the search; they just had to be able to back up whatever they said with facts and/or informed opinions.

Dramatic Presentation

Artz (1998) and others advocate the use of stories in teaching computer ethics materials; as such, the concept of a dramatic presentation of the material is not a stretch. In the case of this study, a group of 4 learners were given a scenario and asked to develop a script around it. They were given complete freedom as to who would play what role, how the presentation would be structured, and ultimately what the goals of the presentation should be. It is not the intent of this researcher to suggest that this is the best way to do this. Depending upon the acting ability of the learners involved, the instructor may need to be more or less involved in the development.

The story told in this particular presentation was a reasonably familiar one to the students. A consultant is hired by a firm to develop a rather complicated piece of software. As the contract is being negotiated, the consultant offers the firm the opportunity to purchase a maintenance agreement. They refuse, stating that they have a competent IS staff that can handle it. The consultant knowingly presents them with a system that is not full implemented, but gives the firm a 2-week period to test the system themselves. They test it and are satisfied, and pay the consultant. After problems arise, the consultant offers to fix things at a reduced rate, acknowledging that at least some of the problems may be her fault.

Structured Controversy

In contrast to the other methods considered in this study, structured controversy is like unfamiliar to most computer science educators. More complete descriptions of the approach can be found in Johnson and Johnson (1974) and Bohy (1993). In the interest of space and time, a brief synopsis of the method is presented here. Before the learners are involved, the instructor must choose the topic of the controversy, and (depending on the level of the students) provide materials the learners will use to support their position. The learners are then randomly assigned to one of two teams, each of which will take up one side of the issue involved.

On the first day, the idea behind structured controversy should be presented to the class and the participants should be given their team assignments and supporting materials. The first step is for each team to learn its position. The team will decide how it will advocate its position, read the supporting materials, plan a persuasive presentation, and master the materials so that their presentation is clear and understandable to the opposite side. Most of this activity should take place outside of class (Bohy, 1993; Johnson & Johnson, 1974).

The second step is for each side to present its position. These should be as forceful and persuasive as possible. While one side is presenting its position, those on the other side should listen carefully and take notes; these notes will be used to clarify anything that is not understood. Once both sides have presented, there is a general discussion of the issue among the two groups. In this discussion, the groups should listen critically, ask for facts and be prepared to present counter-arguments (Bohy, 1993; Johnson & Johnson, 1974).

The next step is what truly separates structured controversy from debate. In this step, the groups reverse perspective; each group presents the viewpoint previously presented by the other side. It is important that these presentations be sincere, and the position is elaborated with new information that may have been gained through the preceding presentations and discussion. This is also the reason that it is important to randomly assign the groups, rather than letting the learners choose a side. If they already have a bias regarding an issue, they will be forced to consider the other side regardless (Bohy, 1993; Johnson & Johnson, 1974).

The final step in structured controversy is to reach a decision. The participants are to take the best arguments from both sides and synthesize them into a solution that is supported by facts and reached by consensus. This is the other piece that separates structured controversy from debate; it is not necessary to choose a single side as the winner (though this is sometimes the result). The report is an important tool for evaluating the effect of the controversy. Further, those who observed the activity are also divided into groups and asked to write a similar report (Bohy, 1993; Johnson & Johnson, 1974).

An important key is that the participants follow the rules for participating in a structured controversy. These are outlined by Johnson and Johnson (1974), and focus on the idea that there is no “winner,” that none of the activity should be made or taken to be personal, that it is important to seek clarification, and that it is important for everyone to be engaged in the process. In other words, those participating should seek to be inclusive. The instructor should closely enforce these rules so that things do not get out of hand.

In this study, a group of four students was asked to do a structured controversy on the topic of intellectual property. In particular, they were asked to consider current legislation/policy on ownership of software created while under employment, especially software created use outside of the employment situation (e.g., writing and independently selling a game while employed to write accounting software). Each group was given minimal guidance by the instructor, the basis being that these were mostly seniors and that they should be capable of gathering sources.

Methodology

The purpose of this study is to examine student attitudes toward different approaches used to teach ethics material in computer science. The instructional methods chosen were chosen purposefully; they are cooperative in nature and the instructor (this researcher) is

familiar with them. There are essentially two questions guiding this research: a) Do learners have a positive attitude toward cooperative methods used in ethics instruction? and b) Do they show a strong preference for any one of the methods?

There was no particular goal of assessing their attitude toward ethics instruction in general; an answer to that question came out of this researcher's earlier work (Bohy, 2003), as well as similar data gathered in a pilot study of that work. In particular, 12 of the subjects that participated in this study also filled out survey instruments regarding their understanding of ethics as part of a pilot study (Bohy, 2003). Of those 12, only 4 indicated that they did not agree that ethics instruction needed more emphasis in the curriculum. All 4 were non-traditional students currently employed in the field.

Subjects

The subjects who participated in the various activities were 11 students (4 female, 7 male) enrolled in a systems development course at a small, private, liberal arts college in the Midwest. In addition, there were 3 male students who were enrolled in the senior seminar course at that same institution who came in and observed all of the activities. Of the 14 subjects, 5 were classified as non-traditional learners (over the age of 25), and 5 were currently employed in the computing field.

In terms of assigning the projects to the students there was some initial difficulty. The initial approach was to offer the students the opportunity to choose which activity they would participate in. Since two of the activities (the drama and structured controversy) were relatively unfamiliar and the third (position paper) was something that they basically did not enjoy doing, they were reluctant to choose. The subjects were randomly assigned to the projects, which actually worked out fairly well.

Data Gathering

The data gathered in this study is qualitative in nature. There are a number of reasons for this. First, to some extent, qualitative methods are better for the assessment of subject attitudes; the subjects are allowed to express themselves more fully and clearly. Second, the intent of this study is to present a number of alternatives that all promote learning; anecdotal data fits this sort of mold better. The fact is that there are valuable pedagogical alternatives out there that are accessible to both instructor and student.

For each of the instructional methods, the subjects were divided into 2 groups: participants and observers. Participants were to turn in notes of group meetings during preparation for the presentation. During a given presentation, the observers were supposed to take notes. Following a presentation, both groups were given a set of prompts to respond to. Some were for all, others were for the participants only. The following 8 questions were common for all of the activities; a additional question asked

on the final set of questions asked the students to consider whether or not there should be a separate class in the curriculum that covered this material.

1. How would you characterize [method] as a learning activity?
2. Would you want to participate in an activity like this (or if you were a participant, did you enjoy it)? Why or why not?
3. Can you see where an activity like this might have fit into another class you have taken in your major? If so, give an example of the class and/or the topic that could be covered. If not, why not?
4. What do you see as the strengths and weaknesses of this activity as an observer?
As a participant?
5. Do you think that the group was able to effectively deal with the question at hand using this activity? Would there have been a better way?
6. Would [method] be an appropriate activity for all areas of ethical conflict in information systems?
7. (for participants) – What additional guidance/support could you have used from the instructor to make this activity a better experience?
8. (for participants) – How much time did you spend in preparation for this activity? Was it enough? Any advice you would pass on to those who might use the activity in the future?

The instructor also took extensive notes, focusing on the quality of the presentations, the level of participation from the group members, and the observed reactions from other members of the class. During the presentations, the instructor (as much as possible) tried to remain an impartial observer.

Results

The presentation of the results is oriented around the instructional methods themselves, and then the answer to the final question (should there be a separate course?). Each section begins with commentary from the participants, then the instructor (which is presented in the first person), and finally the observing students. When appropriate, the written responses of the subjects will be directly quoted as part of the results. The first time a given subject is referenced they are given a gender-specific pseudonym and identified by whether they are a traditional or non-traditional student. Repeated reference to a given subject will be identified by pseudonym alone.

Position paper

Three students worked together on the position paper activity, Karen (non-traditional), Alice (traditional) and Frank (non-traditional). The paper was a total of 10 pages in length and cited a wide variety of appropriate sources. Each participant claimed to have spent roughly 10 hours working on the project, much of that time working together. The main difficulty reported was deciding on what the tenor of the paper should be. In general, the subjects believed that they had received sufficient guidance from the

instructor. Karen notes, “If we did not understand what to do for the paper, we asked. We need to take responsibility for the work we are required to do.”

From my point of view, the paper was very polished and the presentation went well. I did note some difficulty (and this seems to be universally true) regarding the amount of material that was crammed into a single slide; as one example, they put the entire 10 Commandments of Computer Ethics (Computer Ethics Institute, 1997) on a single slide, rendering them to be very difficult to read. In general, I observed genuine enthusiasm about the topic (product liability). Further, it was clear to me that they had done their research; they presented specific cases that had not been discussed in class and did an excellent job of not using “jargon” when possible. When they did use jargon, they defined it. Finally (and unexpectedly), the group tied the notion of product liability into why computer science is not a profession, echoing many of the same sentiments that are raised by Martin (1998).

The vast majority of the subjects believed that a group position paper was an appropriate way to present some ethical material. John (a non-traditional student) had the most striking argument against the appropriateness, noting, “Not the best method, hard to get the class involved ... hard to include the group.” Jeff (a traditional student) takes it further, “I can’t say that I would actually *enjoy* writing a position paper myself, but I can see how the activity could force students to learn about a topic that they had never thought about in detail.”

All of the subjects believed that group position papers would be appropriate in other courses in the major. They were also in general agreement that a position paper was a good way to present information about a broad topic (like product liability), but that it was likely not appropriate for all issues. Anne (a traditional student) states, “...a position paper gives a description of the topic, yet does not reveal pro and con side of the topic. I believe that both sides of a topic need to be discussed in some ethical conflicts.”

In terms of strengths and weaknesses, the subjects were again in general agreement. A position paper is a good way to present information on a broad topic. The primary weaknesses cited here were the same that this researcher cited; the participants tended to read directly from their slides, and the slides were too packed with information. Others, like Ed (a traditional student) were worried that, “a subject could be too broad to fully cover it even as a group.”

Dramatic Presentation

Four students worked on the dramatic presentation: Amy (a non-traditional student), Ed, George (a non-traditional student) and Burt (a traditional student). The group basically reported having divided the work as a group, going off and working for a day or two individually, then coming back and bringing the presentation together to iron out any bugs. At first, there was reluctance given the open-ended nature of the assignment (one goal was for them to decide what the most important issues were for themselves); at the

end, there was some worry about the apparent “ease” of the assignment among group members. In general they agreed that they had received more than adequate instructional support. While it was clear that none of them were “accomplished” actors, the group did a good job developing and presenting a coherent script. They broke the scenario up into a number of issues and tried to generate group discussion during the drama.

I was suitably impressed with this group’s work. They correctly identified the main ethical issues in the scenario. Each time an issue came up, they turned to the group for discussion, then explained what was going to happen, then went on with the drama to the next point. My biggest concern going in was: would they be able to maintain their composure throughout the time? For the most part they did. I was also impressed that, though it was not a requirement, they memorized their lines. One group member (Ed), acted as a narrator. Another member (George) did not seem to participate in the actual presentation to the same extent that the others did, but none of them noted that in their evaluation of the activity. Amy took on the biggest role and did *very* well.

In terms of student responses to this activity, they were of a fairly unified voice. They correctly identified the activity as being highly appropriate for some situations and for having applications outside of just ethical situations. They clearly saw applications of the activity to other courses in the major, again extending beyond ethical situations (e.g., the software development process could be role-played). They also noted that role playing provided a different perspective, that it was more “real” in some sense. In particular, they liked it for this scenario, and described it as being a more engaging activity than some sort of lecture.

The area where they were not in agreement is the area one would expect them not to agree. When asked if they would like to participate in this sort of activity, the subjects were split right down the middle. Those who would like to do it thought it looked like fun, and again cited the idea of the activity being more engaging. Those who would not like it didn’t like any of the activities used in this study; they don’t want to get up in front of people. Others, like Paul (a traditional student), didn’t like the open-ended nature of the assignment; “I would not want to participate in an activity like this because it involves too much ‘fleshing out’ of the main problem or question in order to turn it into this type of activity.”

Structured Controversy

Four students participated in this activity: Ted (a non-traditional student), John, Anne, and Paul. They were given the topic of intellectual property legislation. They divided into groups of two, each taking a side (pro or con) relative to current legislation. This group very much enjoyed the activity and wrote more in response to those questions than did any of the other groups. Anne notes, “I liked structured controversy rather than a typical debate that classes usually assign ... when people are forming a general agreement in a structured controversy activity, they can mix things from the pro and con side.” Each sub-group worked hard to find the positions on their side, but admitted that

they might not have spent enough time rehearsing. The group did generally believe that the instructor should have done a better job of letting them know exactly how structured controversy works.

I'd have to agree with them on that as well; I did not spend time with them as a group outlining some of the rules regarding structured controversy. In spite of that, they did a very respectable job of staying true to the spirit of the activity. Nothing became personal. Both sides were very articulate and persuasive. There is considerable gray area in this particular issue, and they picked up on that. Both the pro and con sides used the notion of the vagueness of current legislation/policy to support their position, which I think was okay. The class discussion was *very* lively. The resulting position statement at the completion of the activity was quite useful; we probably should have looked at getting a student paper out of this.

In terms of observer evaluation of this activity, the voices again were fairly unified. Everyone was able to distinguish the activity from a simple debate. All but Amy (who notes that it's great for those who like to present things, but "I don't like to present things") would have been willing to be a part of the activity. They saw applications to many different courses in their major, except perhaps programming courses. The only obvious weaknesses that any of them observed related to the topic of the presentation rather than the activity itself; essentially, there was too much gray area in this topic. They observers thought, as I did, that the group did an excellent job in spite of that. And they agreed to a person that structured controversy would be appropriate in any issue that had clearly delineated sides (pro and con).

Should there be a separate course?

The group was evenly divided on this question. All of them did note that the material is very important. Some believed that the separate course was necessary because there was simply too much material to integrate it through the entire curriculum. The sentiment was best echoed by Anne, who states, "The topic is becoming more important daily and students entering the workforce need to know about computer ethics. Throwing a graduate into the workforce whom just knows the application and concept part would be a scary thing. A graduate also needs have ethical responsibility when dealing with computers." Others, like Ed, believed that, "...I don't see why it isn't just as effective by incorporating it into a class. This allows you to relate it to what your actually learning about in the class."

Conclusions

Recall the questions which guided the study: a) Do learners have a positive attitude toward cooperative methods used in ethics instruction? and b) Do they show a strong preference for any one of the methods? The answer to both of these questions is a qualified "yes." Before delving in to what the qualification might be for each question, it

is important to again comment on the generalizability of this work. It is not the intent of this researcher to somehow hold this study up as the standard bearer. Institutions, students, and instructors are different. That being said, it is possible to look at this as a basis for implementing these methods for yourself.

Yes, the learners have a positive attitude toward cooperative methods for learning ethics material. Is it universal? Perhaps not, because as Jeff points out, "...I might find an activity like this more fun than the same old tradition of listening to a lecture and taking notes. But many students, myself included, have gotten so used to the listening-to-lectures-and-taking-notes routine that they may be uncomfortable doing anything else." In general, though, all of the activities were received as being more engaging.

Yes, there was a definite preference for one of the three methods: structured controversy. Again, the only real complaint from the students (both participants and observers) was the topic chosen. That being said, structured controversy needs to be chosen by instructors carefully. It is important that an instructor be comfortable with the method and that they provide an appropriate amount of guidance to the students. This may include giving them a set of articles or other appropriate materials from which to form the basis of their arguments (or at least references to the materials). It will almost always include informing them what the basic tenets of each side of the argument is.

Whether you choose an integrated approach or a separate course, these methods have been demonstrated (at some level) to be both useable by instructors and acceptable to students. The key concept that appeared over and over in the student assessments of the methods was that of engagement. Talking about ethics is one thing, but getting the learners involved in an activity where they have to apply ethics in some way is quite another. Given the import attached to this topic, we should treat it like any other computer science topic. In short, the way students will learn to write programs is to practice writing programs. The way they will learn about ethics is to practice ethics.

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