

# ISSA Proceedings 1998 - Teaching Logic: How To Overcome The Limitations Of The Classroom



*Dobie Gillis:* You mustn't take all these things so literally. I mean this is just classroom stuff. You know that the things you learn in school don't have anything to do with life.

*Polly Espy:* Dicto Simpliciter (Shulman 1951: 61).

Dobie has been devoting their dates to teaching Polly the informal logic that he thinks she needs in order to be up to his standards. When he finally is satisfied with her progress and tries to transform their relationship from "academic to romantic," she frustrates him by finding fallacies in all of his overtures. Out of desperation, he attacks his own lessons by warning Polly against treating as fallacious outside the classroom something that is fallacious inside of it. His warning comes too late. Nevertheless, if she is serious in labelling his romantic overtures as fallacious, then she is wrong to do so because Dobie is only expressing his interest in her and hoping that she will return it, not arguing for anything. If Polly has misused his lessons, Dobie bears some responsibility for it because, in common with many other teachers, he has not tried to compensate for the fact that lessons on the fallacies are likely to encourage students to look for mistakes even before they consider what the speaker or writer could be saying or doing.

In this paper I make some suggestions as to how logic teachers can overcome the limitations of the classroom. The first section proposes that students consider the significance of the results that cognitive psychologists have obtained when they give subjects certain logic problems to solve. When students see how predictable it is that mistakes will be made, they may want to ask how the classroom contributes to their own failure to master logic. The second section proposes that students be given lessons that are self-critical or critical of other lessons in logic. An ingenious and imaginative way of introducing logic is offered as an illustration of the kind of lesson that students be asked to critique. The third section is about how to teach students to give a critical reading to an argument. A letter to the

editor is quoted, and, to overcome the limitations of the classroom, it is proposed that students be assigned the roles of different parties to the argument. The paper concludes with some observations about the values that should inform critical analysis of argumentation.

### *1. Why do students do so badly in logic?*

Students in a formal logic class have problems that can be surprisingly persistent, and these problems tend to be the focus of our pedagogy. They struggle with negations in compound statements, applications of the concept of validity, the truth table for the conditional, and equivalences that involve the use of 'only', 'if', and 'unless'. Some students, notably those with backgrounds in mathematics or science, don't have these problems. Nevertheless, research reveals that almost everyone, even teachers of logic, fail the Wason Selection Task, and some cognitive psychologists have concluded that we are programmed to be in cognitive dissonance with how we should be thinking, a matter thoughtfully discussed in Manktelow and Over (1990: 149-58).

I invite my students to think critically about this research by including versions of the Selection Task on the 'pre-test' given to the students. For example:

Shown below are drawings of four cards. Each card has a letter on one side and a number on the other side. Here is a rule about these cards: *if there is a vowel on one side, then there is an even number on the other side*. Which of the cards do you have to turn over to decide whether the rule is true or false?

E - K - 4 - 7

Because most students do not give the 'correct' answer, 'E' and '7', and because they give so many different answers, they will be interested in thinking about why they go wrong.

Cognitive psychologists have experimentally verified that a different wording of the problem makes a difference. They have found that subjects do much better when the Selection Task is presented in versions that are more like problems someone may actually confront, for examples, as sales receipts with the amount of the purchase on one side and a place for the signature of the manager on the other, where the rule that subjects are asked to work with is that a purchase over a specified amount requires the manager's signature.

However, experimenters have been troubled by the likelihood that the subjects who do better with these more realistic versions are not relying on purely *logical* considerations. To test this possibility, experiments have been designed to see

whether or not there is a 'facilitation effect', i.e., where subjects seem to be relying on their own knowledge or experience. Cheng, Holyoak, Nisbett and Oliver (1986) have suggested ways for teaching logic differently based on the results of some of these experiments, but their work is critiqued in Cosmides (1989), and the issues that divide them, together with a helpful review of much of the research done on the Selection Task may be found in Manktelow and Over (1990).

Ironically, the emphasis on the facilitation effect serves to raise a doubt as to whether we ever do or should rely on purely 'logical' considerations when reasoning, except when in the classroom (or when doing brain teasers). 'Logical' considerations seem to be in back of the use of the conditional in the statement of the rule, and I think that students should complain about its use, as they should complain about the reference to it as a 'rule'.

When it comes to some of the more realistic versions of the Selection Task, this reference to a rule and the use of a conditional make sense: we can understand how there might be a rule in a department store about how much a purchase has to be before it requires the signature of the manager. However, there is no activity in terms of which the reference to a rule makes sense in the card version of the Selection Task other than an activity that is like the one mathematics students engage in when asked to state the principle, for example, behind the generation of a specified sequence of numbers.

When I ask students to think about why they have gone wrong, I suggest that they consider whether it is the use of the conditional that has misled them. Its use is mystifying, suggesting as it does that there is some reason for expressing things conditionally. "If there is a vowel on one side there is an even number on the other." This seems to suggest that there is some underlying connection. However, the real reason why the conditional is being used is that according to logic the rule that takes that form is equivalent to another version of the rule that is easier to understand and does not employ a conditional, namely, that a vowel is not paired with an odd number. Why, then, state the 'rule' as a conditional? The unfriendly answer is that logicians and cognitive psychologists are insensitive to the significance of the fact that the forms that they count as equivalent would not be substituted for one another when people actually talk to each other, and so they do not take responsibility when the substitution ends up confusing people.

Next, I invite students to ask what can be done to compensate for the limitations of the lab or classroom. Unlike the experimenters, as a teacher I *want* students to

make the right selections. So I ask them to reword the Task question to make what is being asked clearer. Here is a possible rewording: "There are four possibilities: vowel/even; vowel/odd; consonant/even; consonant/odd. Which cards would you have to turn over in order to determine that the possibility of vowel/odd has been ruled out?"

Some students might still not make the right selections. If this happens, there is an explanation for why they do not that experimenters seem to ignore, namely, that the students are suffering from what might be called the dumb class syndrome. This is a condition that affects students who can apply certain lessons when called upon to do so outside of the classroom but are paralyzed or unable to function when inside it.

My suggestion is that the Selection Task be taught as a lesson on how the classroom (or laboratory) has built in limitations. Students can be asked to reflect on the influence of the context in which the Task is presented on rates of success or failure. They also can be helped to see how the 'correct' answers are counted as correct only because the Task is understood in terms of a specialized discourse, and that there is a problem applying the results to actual discourse.

There is value in teaching formal logic, despite what the lessons I have been proposing in this section might suggest. I doubt that there is much practical applicability for lessons on formal validity or on equivalences, let alone lessons on algorithmic facility with truth functional or quantificational schemata. However, I think that lessons in formal logic can be valuable in helping students to become more aware of the significance of how things are worded, especially when a determined effort is made to supplement logic lessons with other lessons that compensate for the limitations of the classroom.

The most important lesson in formal logic is usually taught before any of the lessons that I have referred to in this section, the lesson on what an argument is and how to read and formulate it. It tells students to think about what, if anything, is being argued by asking whether the arguer is taking a position, and, if so, what that position is and what support is being offered for it. In the next section, I suggest that the lesson be used to illustrate itself, and I show how this might be done by a critique of an intriguing way of introducing logic.

## *2. What a Difference a First Day Makes*

The lesson I have chosen, because it is so pedagogically appealing, and because it deals with some of the central concepts of logic, is one proposed by Alan Penczek

(1996). I come to the first class a bit late, and behave as I normally do. After removing various items from my briefcase, looking for chalk, and erasing the blackboard, if necessary, I ask:

How many of you believe that I am the instructor of this course?

I can expect the class to react with surprise and laughter. I repeat the question, and ask the students, by a show of hands, to indicate whether they believe that I am the instructor. Most will raise their hands, and I confront those who don't and ask them:

Who *do* you think I am?

Presumably, the question is sufficiently intimidating that I can go on to say that every student has concluded that I am the instructor. I keep a straight face and do not admit that I am the instructor while I act like one by telling the class that each of them has engaged in a "piece of (inductive) reasoning," whose "conclusion" is that I am the instructor.

Penczek's next instruction is that I write 'He is probably the instructor in this course' on the blackboard with a line over it, and then tell the students the following:

You have come to believe that I am the instructor of this course, and we are calling this your *conclusion*. However, you must have had some reasons for calling this your conclusion, and we will call these reasons *premises*. These premises together with this conclusion make up an *argument*. Can anyone suggest some of the premises that you might have used in coming to this particular conclusion? That is, why do you believe that I am the instructor? (p. 122).

The premises are supposed to cite what I did when I came into the classroom - went to the front of the classroom, put my briefcase on the desk there and removed some items from it, erased the blackboard, and asked them a question - and I am to state each 'premise' as a declarative sentence in the third person. Then I point out that the argument is an enthymeme and that when supplied with a missing premise - 'people who have turned out to be instructors have looked and behaved as he did' - the argument is inductive because it is possible for the premises to be true when the conclusion is false if, for example, I turn out to be an unhappy ex-student who is pretending to be the regular teacher.

Penczek's pedagogy seems likely to get the attention of the students and engage them. The lessons I proposed in the previous section ask students to explain why

they make the mistakes they do in logic; the lessons I am proposing in this section ask the students to think about why they have so little trouble learning what Penczek is teaching. Of course, when a lesson is as successful as his lesson promises to be, it is harder for students to think about it critically.

To help them to do so, I ask them to consider how they would react when they are standing before a receptionist's desk and are asked by the person behind it, "Do you believe I am the receptionist?" I want them to see how disconcerted they would be by this question. Are they not supposed to stand there? Is the receptionist saying that she has too much to do? Is it the wrong desk?

I ask them why they were so obliging and did not challenge me to explain why they did not do with me what they would have done with the person behind the desk, namely, ask, "Why are you asking me that question?" They might answer by saying that they assumed that the question was part of a classroom exercise, and I ask them to formulate this explanation as an argument. What I really want to suggest to them is that it is questionable that the explanation should be formulated as an argument. After all, what is being explained is why students did not behave a certain way, not what support they could have had for some conclusion they have drawn.

Why is Penczek interested in what they believe? This is the next question that the students should be asked, and they will need some help in order to give the right answer, namely, that by getting them to answer the question about what they believe about me, the question of what reasons they have for this belief can be raised:

what they are supposed to believe, namely, that I am the teacher, can thus be considered the conclusion of an argument whose premises are the justification that they have for that belief.

I ask them to formulate Penczek's argument for the claim that they do believe that I am the teacher even when I behave as I normally do on the first day of class if do not identify myself as the teacher, but do not ask them who they think I am. Here is how they might formulate it:

The students are in the scheduled room at the scheduled time for Elementary Logic.

You went to the front of the room, put your briefcase on the table and took items from it, erased the blackboard, and addressed the class.

So, the students believe that you are the teacher of their Elementary Logic course.

Next, I try to help the students to see that it is not clear how to understand the conclusion or how the premises provide support for it. I ask them to consider how it is possible that I am not the real teacher. Here is what they might come up with:

“You are an ex-student who saw and removed a notice on the classroom door that said that the class has been cancelled, and you decided to pretend to be the teacher” or “You and the real teacher are collaborating in playing this prank on us.”

Given either of these scenarios, the students may be said to *believe* I am the instructor to indicate surprise or satisfaction at how well the masquerade is going. Here saying that they believe it means that they do not suspect anything. However, the students do not have an argument for not suspecting anything; saying that they suspect suggests that they did not even consider the possibility that I am not the teacher, let alone draw a conclusion about it.

“What reasons do you have for thinking that I am the teacher rather than an impostor?” This is the question Penczek seems to want me to ask the students. It is not the original one I was to ask them, because everything cited as the premises for my belief, such as what I did with my briefcase or the blackboard are things that an impostor is just as likely to do. Even so, the students may come up with some answers to this new question that can be turned into premises, such as “An impostor is unlikely to ask this question because it would give him away.”

If they do try to answer, then I ask them to consider the fact that they are answering a question that I do not really have. To see why this is significant, I ask them to consider when or how something might turn on the question of whether or not I am an impostor. If my status as the teacher needs to be determined, then they can contact the Philosophy Department or do some other checking outside the classroom, which is not the best place for such detective work. However, since I do not really have the question when I ask them whether they believe I am the teacher, then obviously nothing could turn on answering it, and so, there is no real basis for understanding the answer or determining the support for it.

However, any lesson that is critical of how a logic lesson does not compensate sufficiently for the limitations of the classroom should make clear why the lesson is worth criticizing. So, I take pains to make clear that there is nothing distinctive about what Penczek is teaching. Almost all logic teachers would refer to the student’s ‘reasoning’ as an ‘argument’, and would applaud Penczek for trying to identify the ‘premises’ for the ‘conclusion’ that he says that the students have

drawn. Others use different illustrations, but they, too, do nothing to compensate for the fact that these illustrations are devised for the classroom and are not to be understood by imagining how they might be taken from actual discourse.

What turns on the failure of logic teachers to compensate for it? I hope that students will ask this question. If they ask it, then an answer can be suggested: the failure is significant because it reinforces a mistaken conception of argument and reasoning according to which an argument does not need to be understood as a response to anyone or anything. "Do you believe that I am the instructor?" The students are to answer this question without having any idea how it arises or why they are being asked it. So, any answer that they give will reveal more about the limitations of the classroom than about what they really think or believe.

Penczek's pedagogy engages students by using their responses to illustrate the lesson he is teaching. I am proposing that students be encouraged to think critically about what they are being taught. However, they may be frustrated by the teaching of a lesson like Penczek's when it is subjected to critical examination. To avoid that happening, they need to be told how valuable Penczek's lesson is just because it can be criticized, how it is a strength rather than a weakness of the lesson that it gives them something to think about while succeeding in introducing them to certain concepts.

However valuable it may be to encourage students to think for themselves even about what they are being taught, the real value of a logic course is that it helps students to think critically about actual arguments. The next section makes some proposals about how to overcome the limitations of the classroom when dealing with such arguments.

### *3. Giving a critical reading to actual rhetoric*

The hardest thing to teach when it comes to argument analysis is how to determine whether an argument is being given, and, if so, how to paraphrase that argument. In this section I suggest some pedagogical techniques that may be used to help students learn to read more critically.

Let me explain why I think there is a need to supplement what students are usually told about how to interpret an argument, namely, that they should identify the position that is being taken and the support, evidence or reasons being offered for that position. They are instructed to restate the argument as a series of declarative sentences, as premises followed by a conclusion. They are told to supply any and all missing premises (or, if it is unstated, the missing conclusion). Although the advice can be useful, it is of limited value without a lot of other



advice, except when applied only to the contrived examples often used in the classroom. To see why, consider this letter to the editor in the *Portland Oregonian* (March 13, 1997).

If faced with making an end-of-life request for physician-assisted suicide, I want to make my own decision. If assistance in making this decision is necessary, I want to choose my advisers carefully.

I am not a Roman Catholic, so I do not want the pope or his hierarchy to participate in making my decision. I do not want evangelicals, with their idiosyncratic reading of scripture, to participate in the process.

It is incredible that people who are not wanted and have no place in my daily life think they have a right to stand by my death bed and tell me how to die. Although well-intentioned, I want these people to mind their own business. My personal and painful decision is not their business.

(signed) Fred Ratzeburg

The usual lessons reading an argument do not yield good results when applied to this letter. If students are encouraged to take him literally, then the position he seems to be taking is that he does not want Catholic priests or evangelicals to advise him when he is dying because he is not a Catholic, he does not accept the evangelical Bible interpretations, and these priests or Evangelicals are not his friends and do not have a place in his daily life.

Ratzeburg is not a Catholic and does not trust the interpretations of the Bible by evangelicals that they rely on when talking about moral dilemmas like physician assisted suicide. Ratzeburg does not have any members of the Catholic hierarchy or any evangelicals as friends or family. So, Ratzeburg does not want these religious people to participate in the decision he will be making about asking a physician for help in killing himself.

This formulation of his argument seems faithful to what he says, but the statement of the conclusion could be improved upon to reflect the fact that he is saying that these religious people have no business telling him what he can do.

So, priests and evangelicals should not participate in the making of his decision whether to ask a physician for help in killing himself.

However, something significant seems to have been lost by this replacement of Ratzeburg's voice by that of the reformulator. How he expresses himself and what that reveals about why he is giving the argument is an important clue to what he is arguing, as is whom he is addressing, or what he is writing in response to. Even

if we want students to focus on the issues he might be addressing, they need to be reminded of the significance of the fact that any reformulation or restatement of the argument is likely to ignore something of importance to the reading of the argument.

Moreover, the restatement, especially if it takes the premises-and-conclusion form, tends to encourage a pernicious form of logic-chopping. By reducing Ratzeburg's letter to a sequence of sentences we make it easier for it to be dismissed, when what we should be doing is finding ways to illuminate the issues he is raising. Because the focus is on the restatement, rather than on what he is giving us to think about, the formulation of premises that are too abstract or general or obviously unwarranted is encouraged.

To reveal to students what may be lost in translation I propose that they be assigned the roles of the different parties to the argument: Ratzeburg; a spokesman for the Catholic Church; an evangelical Christian; a non-religious person opposed to euthanasia; and a supporter of euthanasia who is religious. (Another teaching technique has groups of students rather than individuals play the different roles.) The objective is to enable students to give a critical reading of an argument by recreating in the classroom the conditions that would prevail when the arguer was available to respond when his argument is critically analyzed.

Although it is not possible to anticipate what will happen in the panel discussion, certain developments might take place. Ratzeburg may be challenged to explain why he is targeting the Church or whether he thinks that it should not speak up or try to influence people on a matter it cares deeply about. He may be defended on the grounds that his real concern is that public policy not be decided on religious grounds, and this defense may be questioned by citing non-religious objections to mercy killing or by attacking what seems to be a pro-choice argument for assisted suicide, perhaps by questioning whether doctors are the right people to determine whether their patients are in their right minds when they ask for help in killing themselves.

If the panel discussion is very successful it will provide the students with things to think about. The rest of the class can be asked to evaluate the panel discussion: How might the panelists have improved on what they said? How responsive were they to each other's points? The students also can be asked to say what they now think is at issue. Is the issue pluralism? Is it the role given to the doctor? The objective of the panel discussions, or any other pedagogical expedient that the

teacher utilizes, should be to help in identifying what is at issue in the argument together with the issues raised by the argument.

After the panel discussion, encourage the students to try to paraphrase his argument. "Try to say in your own words what Ratzeburg is saying." This is the first step in paraphrasing. "Try to state the argument in a way that best reflects the thinking of the arguer." This should be the second step. The paraphrase should make relevant references to the rhetorical context of the argument, and it also should make clear what there is to think about.

Ratzeburg is writing out of his exasperation with the lobbying done by the Church and other opponents of euthanasia who are evangelical Christians. To dramatize his dissatisfaction with their role, he depicts them as wanting to be by his bedside when he is dying to influence his decision about how he is going to die. This dramatization makes it seem as though their role is the issue, and so appeals to anyone in his audience who shares his worries about the lobbying by powerful religious groups, despite the fact that it is highly unlikely that he favors muzzling the Church.

However, there is more to his argument than the appeal to a certain anti-religious sentiment: he seems to be offering a version of a pro-choice argument for euthanasia. Even though religious people may reject physician assisted suicide as an option; others should be free to do what they want to do. Ratzeburg seems to assume that the only opposition to euthanasia is on religious grounds, that there is no need for him to speak to any of other objections to physician assisted suicide. His argument sees pluralism as the issue and objects to the use of religious imperatives to determine social policy.

Whether or not the student is successful at paraphrasing, the attempt at doing so is important because it makes the student a participant in the argument.

Although I cannot claim from my experience with the use of these techniques that students are usually very insightful or perceptive in the critical readings that they give to the argument, I believe that it is important that the techniques be used to compensate for the limitations of the classroom. When we restate or even paraphrase Ratzeburg's argument we can't help removing something of him from the argument, and these techniques help to do something to get his voice back.

There is another reason for the panel discussion approach. Because the argument is being discussed in the classroom, students (and teachers) are encouraged to suppose that they can think critically about an argument without asking

themselves why they are doing so. Teachers may insist that the real object is to shed light on what is at issue in the argument, but their practice often makes it seem as though the objective is to sit in judgement of the argument. However, when we think about the goals of argument analysis, models other than one where there is a battle or contest with a possible winner or loser recommend themselves. I am thinking, in particular, of the conflict resolution model, according to which our concern when reading an argument is to find a way to bring people together. Consequently, our paraphrase of the argument should speak to the concerns and interests of different parties to the dispute.

We should try to address what bothers Ratzeburg, namely, the power that religious groups have in influencing public policy, and the need to acknowledge that we live in a pluralistic society. At the same time, we can remind him that he should not assume that the opposition to euthanasia comes only from those who have theological objections to it, however idiosyncratic those objections or the scriptural basis cited for them might be. By doing so we can speak to at least some of the concerns of opponents of euthanasia. My suggestions about how to resolve the conflict may not turn out to be successful, but they seem to be informed by better values than is the attempt at giving a reading whose objective is the reaching of a verdict - valid or invalid; correct or incorrect - on the argument.

These remarks about the objectives of a logic class lead in the next section to a discussion of the values that should be embodied in a critical thinking class.

#### *4. The Paradox of Teaching Critical Thinking*

There is something paradoxical about the charge we are given as teachers of logic or critical thinking. We are to teach students to think for themselves. To do so we have to rely on certain lessons, and the lessons have a certain built-in authority. Students are being told to think for themselves while at the same time they are encouraged to learn certain lessons that someone else has thought up for them. This apparent paradox is another reminder of how important it is to try to compensate for the limitations of the classroom.

In this paper, I have offered some suggestions about how to teach students to think for themselves. In the last section I offered a proposal about how to teach students to read an argument critically that made them participants in their own education. In the sections before that I advocated the use of lessons that were self-critical, critical of other lessons in logic, or that asked students to think about why they were not getting the 'right' answers. Even a self-critical lesson is a

lesson, and unless students come to make the criticisms on their own, they will not really be thinking for themselves. Although there always is a risk of their losing confidence in what they are being taught when the lessons are criticized, the goal is to help students to see how any real discoveries they make grow out of their own struggles.

Another way to compensate for the limitations of the logic classroom is by teaching certain values by example: *respect* for the views of the opposition; *imagination* and *compassion* to see things from other perspectives; *courage* to anticipate objections to your own views; *integrity* to admit when you do not understand or are wrong; *responsibility* for making your own views clear or defending them when they are challenged. Although I am convinced that the real object of a course in critical thinking is to inculcate these values, telling students to have them when they think critically is not very good teaching, unless the teacher can embody them.

This point was lost on Dobie when he was giving Polly logic lessons to bring her up to his intellectual standard. Not only was the project a foolish one because of the presumption that logic lessons could accomplish this end, but it also provided evidence of how little respect or even liking he really had for her. Further evidence of his sexism is provided by the circumstances that led to his dates with Polly. He had traded his roommate, Petey Bellows, what he thought was a worthless raccoon coat, which Petey badly wanted because it had come back in style, for the assurance that Petey was no longer going to pursue an interest in Polly. As the story is ending Dobie discovers that she will not be his girlfriend because she had promised Petey she would go steady with him. After he calls Petey a “liar,” “rat” and “cheat,” only to be reproached by Polly for *poisoning the well*, he tries to be calm:

All right, you’re a logician. Let’s look at this thing logically. How could you choose Petey Bellows over me? Look at me - a brilliant student, a tremendous intellectual, a man with an assured future. Look at Petey - a knothed, a jitterbug, a guy who’ll never know where his next meal is coming from. Can you give me one logical reason why you should go steady with Petey Bellows? I certainly can. He’s got a raccoon coat (Shulman 1951, 61).

These are the last lines of the story. The ending is funny, but at whose expense? By citing as a ‘logical reason’ the fact that Petey has a raccoon coat, Polly reveals herself to be a faddist, which Dobie earlier referred to as the “very negation of reason” and “acme of mindlessness.”

However, the joke really is on Dobie because his lessons have made Polly less “agreeable,” i.e., less vulnerable to his intimidation and manipulation. She is sufficiently independent that she is even prepared not to be logical when there is no reason for her to be. When Dobie asks for a logical reason why she should go steady with Petey, perhaps she should have challenged the assumption behind his question, namely, that she needs a logical reason for liking Petey and wanting to go steady with him. Rather than make this rather pedantic point, she left it up to readers to make the point for her. Dobie supposed that the mastery of logic lessons has something to do with being smart or intelligent. What he failed to realize is that more, much more, is involved than being a good student of logic. You need to know when it is appropriate to apply the lessons and when it is not appropriate, and you need to have such values as respect, imagination, compassion, courage, integrity and responsibility.

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