

What Does Success in Online Teaching Look Like?

BOAZ FARADAY SCHUMAN
University of Toronto

Abstract: What does success in online teaching look like? There are two ways to answer this question. The first defines success in terms of replacement of educational *means*: for example, how closely does an online lecture approximate its offline counterpart? The second defines success in terms of educational *goals*: for example, how well does an online lecture facilitate learning, compared with its offline counterpart? The first is a trap: it commits us to an endless online game of catch-up with offline models of teaching. Instead, we should adopt a goal-oriented approach, mindful of obstacles to online teaching. As a case study, I present practices developed using this approach to teach philosophy online in 2020. An important upshot is that this approach leaves us open to ways in which online teaching is actually *better* than its offline counterpart. I conclude with some examples of these, and discuss their future implementation.

My teaching career has just begun, and so it has begun online. In April 2020, I was hired to teach my department's introductory course in symbolic logic, beginning in May. As of writing, I am a graduate student, and this has been my first time teaching an undergraduate course. The class enrollment was capped at 150, and I was assigned three TAs. Since the university was closed, all course material was to be delivered online. In many respects, it looked to me like a recipe for disaster: I had no experience managing TAs or classes of this size, and no experience with online delivery of course material. The prior experience I *did* have—mostly, leading philosophy tutorials of about thirty students, and teaching Latin to small classes of seminarians—was not obviously applicable to teaching such a course online. Furthermore logic, as has been elsewhere noted in this journal, is a source of dread for many undergraduate philosophy students.¹ So I was teaching a course many students fear and even drop out of, and in completely

uncharted territory—both for educators new to teaching online, and for me as a brand new educator.

Yet it turns out that my inexperience has worked to my benefit in a crucial respect: because my teaching career was born online, so to speak, I do not know any different than the conditions I now find myself in. Accordingly, since I have nothing to compare the current online mode of teaching with, I have developed my teaching techniques online. I believe my position is rather unique in this respect, and I want to share here the practices I developed and why they worked. The main point I wish to make is that success in teaching online depends heavily on thinking about educational *ends* rather than *means*, and tailoring delivery of content to the former. I call this the telos-oriented (TO) approach to online learning, and describe application of this approach as TO-thinking.² In an online context, TO-thinking first asks what the educational goals of a course are, and then looks for ways to meet these goals with the technology on hand.

Contrast the TO approach with what might be called the *means*-oriented (MO) approach. The MO approach first asks what a course in the era of in-person teaching looked like, and then tries to find direct online replacements for those in-person modes of delivery. For example, following the MO approach, we might look for a replacement for two-hour classroom lectures, and so give a two-hour video lecture online.³ Sometimes the MO approach works. But often enough, it is a trap: it puts us in the awkward position of palming off online content as a substitute for in-person classrooms—which it is not, and which in some respects (especially social ones) it never can be (more on this in §1.3). Worse, the MO search for exact substitutes includes an expression of nostalgia for offline education. Students feel this nostalgia, too, and it only draws further attention to what is absent in online learning. In short, if we define success in MO terms, we will fail.

Better to be more imaginative with the technology at our disposal, and to admit that online learning cannot replace all the educational means of the in-person classroom in any literal sense. If instead we focus on educational *ends* and the obstacles to those ends, we can set up the conditions for success in online teaching. TO-thinking is the way to go, and in what follows, I will show how to put it to use. An important upshot is that TO-thinking entails a general rethinking of educational modes of delivery and of our use of technology. As an example of this, and as evidence of the fruitfulness of TO-thinking, I conclude this paper with some practices worth keeping whenever we move back to the in-person classroom. These are practices in which TO-thinking gives us an approach that is so effective that it makes online teaching *better* than its offline counterpart. Accordingly, we would do well to keep these practices when we move back to in-person teach-

ing. For example, it is possible to reduce the load of student emails by about 95 percent, by rethinking what these emails are meant to do, and meeting those needs in other ways—an approach I set out in §2.

Here's how this paper is structured: I give an examination in turn of the special problems faced by online teaching and learning, giving TO solutions to each of them. I begin with student disengagement and alienation, before turning to the problems related to promoting academic honesty and creating a social space online. By way of a conclusion, I then give an overview of educational practices turned up by the TO approach which can be fruitfully brought back to the world of face-to-face teaching.

Before all that, however, let me give a brief description of the content and outcomes of the course on which this paper is based. The course is a standard undergraduate introduction to logic, which starts with propositional logic and ends with predicate logic. Along the way, we touch on functions, and see some brief sketches of what metalogic is. I chose *Language, Proof and Logic*⁴ as the course textbook, and adapted the exercises therein for online presentation. I chose this method of adaptation because it is easier than coming up with entirely new examples and problems from scratch, but avoids dishing out the answers to textbook exercises online—or using problems for exams that might be available elsewhere.

At the University of Toronto, this class is a 200-level course administered by the Department of Philosophy (PHL245). It is required for philosophy majors, and frequently taken by students in the STEM fields as an arts credit to meet breadth requirements. The course is a prerequisite for more advanced courses in logic, and is often a recommended prerequisite for 300- and 400-level courses in metaphysics and philosophy of language.

During the fall and winter, the course is one semester long (twelve weeks). Under the present circumstances, I was given both the spring and summer semesters (thirteen weeks in all) to teach the full course online. Course retention was exceptionally high: 129 of the initial 150 students completed the course (86 percent). The average for the same course in this department over the past five years (not including this one), when the course was taught offline, is 74 percent (SD=6 percent). Final grades were slightly higher than average: the average final grade over the past five years is 71 percent (SD=4 percent). For my course, the average final grade was 75 percent—higher than average, but within one standard deviation.

Now that these aspects of the course have been clarified, we can turn to the problems online teaching faces, and to ways of solving them.

1. *Online Problems and TO Solutions*

Solutions make the most sense when they are considered in light of the problems they are meant to address. Accordingly, I here adopt a methodology of examining problems first, and only afterwards discussing solutions. The problems I consider here are not meant to be jointly exhaustive or mutually exclusive, but they are the ones that strike me as the most significant for online teaching. The majority of these problems apply across all areas of philosophy taught online. A few of these are particularly acute in the case of logic and certain courses in STEM. I will flag these as I go. Moreover, I want to be clear that the solutions to these problems need not all be adopted for every course: for some, they might be less applicable due to class size, subject matter and so forth. And some teachers might find them too burdensome to adopt all at once. I have accordingly taken care to structure the solutions to the problems I am about to discuss in a way that allows them to be adopted or forgone independently of one another: use of one practice I develop and discuss below need not entail use of another. The TO approach is not all or nothing.

Still, the problems that motivate these practices are general. The main problems I examine here are those of (1) student apathy and disengagement with online material, (2) difficulties related to academic honesty, and (3) lack of social presence in online contexts. As we will see, there is considerable overlap between (1) and (3). I postpone discussion of (3) to the end of this section, however, because I think it poses an important problem for TO-thinking.

1.1. Disengagement and Alienation

Online teaching faces an inertia problem. For students, online courses are easy to ignore or set aside, and therefore easy to fall behind on. Moreover, online learning can be profoundly alienating. These kinds of disengagement and alienation are my chief concern. Paula Baron and Lillian Corbin discuss the former, and define disengagement in terms of non-engagement or apathy.⁵ Sarah Mann discusses the latter in terms of student alienation as a cause of disengagement.⁶ Both of these studies address disengagement and alienation in the context of the conventional face-to-face classroom. But, as will become clear, the problems and their sources identified by these writers are the same type as those faced by students who take online courses, though different in degree: in general, online contexts aggravate problems.

I have chosen these studies because of their focus on the *problem* of disengagement first and foremost: as a recent (2017) survey of the field observes, most studies tend to discuss student engagement without paying special attention to the root causes of *disengagement*.⁷ Thus

the studies of Baron, Corbin, and Mann are outstanding not only in their analyses, but in their methodology. The special problems faced by online learning call for a clear and thorough assessment. Only with these in view can the TO approach work properly.

As Baron and Corbin note, there is no broad consensus on how to define student engagement or its antonym, disengagement. Yet, they argue, it is vital that any definition of student (dis)engagement include a clause about participation in a *community*: a student working diligently on coursework who has no interactions whatsoever with other students or the teacher is, in Baron and Corbin's definition, not fully engaged. Accordingly, they define engagement in social as well as academic terms:

[T]he engaged student is the student who has a positive, fulfilling and work-related state of mind that is characterised by vigour, dedication and absorption and who *views him or herself as belonging to, and an active participant in, his or her learning communities*.⁸

This rings true. Social engagement is indispensable, and even exists in a feedback loop with academic engagement: a friendly classroom environment is likely to get higher attendance, and encourage participation among attendees. Accordingly, the social and academic varieties of (dis)engagement cannot be entirely isolated. Moreover, social engagement is one of the most difficult things to facilitate in online classes, and so it deserves special attention.

What causes disengagement? Baron and Corbin think the most significant factor is student part- or full-time employment, as well as engagement in other life activities (for instance, seeing family and friends).⁹ This is a vital point: any TO-approach to online learning will have to take stock of the fact that the course is competing for student attention, and should accordingly be relatively easy to fit into a demanding and busy schedule. Thus, in order to avoid the sort of disengagement Baron and Corbin identify, the course must not be easy to ignore for long periods of time, and must not make so great a demand on students' schedules that it becomes too burdensome to keep up with.

For example, imagine an asynchronous course in which two-hour lectures are posted weekly, and in which the assessment is limited to two or three papers, each worth a significant amount of the final grade. This closely resembles many offline courses with lectures in face-to-face classrooms, and in such a context it can work very well. But directly replicating this offline structure in an online course is likely to produce disastrous results. Since the lectures can be watched at any time, they are easy to put off (and indeed relatively few students would watch them at the very same time each week). Since the assessments are few, they are easy to forget about, until a looming due date causes them to become a major source of stress and frustration. Instead, we

need a TO approach that rethinks traditional course structure and mode of delivery, in order to avoid producing schedules and content that are likely to result in student disengagement and stress.

Now disengagement of the sort identified by Baron and Corbin is defined largely negatively, in terms of non-engagement or apathy: a disengaged student is one who is neither dedicated to nor absorbed in the course material, and moreover who does not see herself as a participant in an academic community. But this kind of disengagement can lead to a more active and negative kind of disengagement, as we saw in the foregoing example. This student *alienation*, which is Mann's focus. A student who feels alienated is more than merely apathetic about the course material: she is, rather, excluded. Drawing on Lacanian and Marxian thought, Mann identifies seven types of alienation relevant to teaching and learning. For present purposes, I want to focus on two of these that especially apply to online learning: alienation caused by "loss of ownership of the learning process," and alienation "as a strategy for self-preservation."

Loss of ownership occurs when, in teaching and learning, the "emphasis becomes one on *outcome* rather than on *process*"—that is, an emphasis on student assessments (assignments, exams, and the like) conceived as outcomes, rather than on the process of engaging with the material itself and learning from it.¹⁰ A student alienated in this way is no longer engaged in a process of learning, but instead is merely consuming course material and producing a product for evaluation. This is a general problem for education, but it is especially difficult to manage online. Students learning online are, for the most part, physically isolated from each other, submitting work electronically, and interacting with each other and their teachers only by text (by email, for example, or in message boards), or live but in online chatrooms. As a result, the student-side of online courses can begin to feel like informational inputs and outputs, with the teacher's role defined in terms of inputs (course information), and the student's role in terms of outputs (course assessments). All this is to the detriment of learning as a *process*, which is difficult to conceptualise in online contexts (and especially in asynchronous ones).

Alienation as a means of self-preservation, on the other hand, occurs when a student preserves a sense of self-sufficiency or identity by refusing to engage with course material. The motivation for such alienation is that engagement with the course material brings with it an exposure to unfamiliar and sometimes seemingly chaotic information, and even a possibility of failure. Accordingly, students may shut themselves out completely, to preserve themselves against these risks. This latter sort of alienation poses an especially acute problem for teaching logic. As I noted above, philosophy students often dread

logic, and their dread is not unreasonable: logic can be very difficult and unfamiliar for philosophy students accustomed to texts and essays instead of formulas and problem-sets. This dread is compounded by the fact that many philosophy students really *identify* with their discipline: philosophy is not just a thing they *do*, but a mode of self-expression. Accordingly, failure in a philosophy course is not merely a hit to their GPA: it is the source of a kind of existential dread. (In fact I will readily admit to feeling this dread of logic when I was an undergraduate, so I can sympathise. More on this in a moment).

Lastly, accessibility problems can make disengagement all but inevitable: for instance, students with visual impairments are likely to face difficulties with information presented on-screen, and students with impaired hearing might not be able to read lips in lecture videos. These are by no means problems specific to online learning: conventional classrooms have similar problems as well. But these problems are aggravated online—and there are online tools to mitigate them, as well, as we will soon see.

Here, then, is a summary of the four problems just outlined for online teaching: (i) students face difficulty balancing academic work with other demands (the pragmatic problem), and do not find themselves in an academic social milieu. These factors cause disengagement. Moreover, (ii) students become alienated from their peers, their work, and their teachers when they feel isolated from a learning process over which they have no claim (the ownership-of-learning problem). And (iii) if they feel dread at the prospect of failure, they might further shut themselves out (the self-isolation problem) as a means of self-preservation. Finally, (iv) difficulties with accessibility can be exacerbated by online learning and technology (the accessibility problem). These are significant problems. Fortunately, however, there are TO-ways to address them.

1.1.1. Are We Having Fun Yet?

Let me begin by addressing the pragmatic problem. Student disengagement can, as Baron and Corbin's analysis suggests, be offset by making courses more flexible to adapt to students' schedules. Here, asynchronous classes have a significant advantage over their synchronous offline counterparts: if students can watch lectures at their convenience, then lectures need not conflict with their other activities and responsibilities. But there is a catch: in asynchronous or hybrid courses, *students are being asked to supply their own schedule*. This works for some, though for many it creates a perfect atmosphere for procrastination and inertia, as we saw above. The goal, then, is to find a new way to organize course material that is neither so burdensome as to conflict with students' schedules, nor so elastic as to encourage procrastination.

To this end, making course time-commitments less burdensome—and therefore easier to schedule—can go a long way. To do this, I have abandoned the notion of a traditional hour-long (or longer) lecture. Instead, I boil the material down to its main headings, and then make a brief (approximately five-minute) video under each of these headings, outlining the concepts involved and giving examples. Typically I produce six or seven of these videos to cover a week’s worth of material. Even if these focused sub-lectures take less time overall to watch than an hour-long lecture, they can include more information, since I reduce their overall time by editing out long pauses, “ums” and “ahs,” and moments I take to read over my notes and write text on the virtual blackboard.¹¹ In my experience, such editing alone reduces the length of these sub-lectures by about 40 percent. Such sub-lectures are much easier for students to schedule: rather than watching one hour-long lecture all at once, a student can watch the first sub-lecture, mull it over, and watch the next one later on.

Apart from being easier to schedule, series of sub-lectures structured in this way have two significant advantages over conventional, hour-long recorded lectures. For one thing, they are easier to re-watch. Students can watch online lectures as many times as they like; and if the lectures are focused as dedicated sub-lectures, it is much easier for students to use them to zero in on a concept they want to understand better. Further still, the sub-headings of the sub-lectures provide a ready catalog of the content with which they should be familiar. Conversely, in an hour-long lecture, a student will have to load the entire video and then comb through it to find the point at which the teacher begins to talk about the concept the student wants to focus on. This is a significant disadvantage, and one that is not forced on us by the technology at hand.

Second, sub-lectures are easier to buffer or download. A good deal of online learning is done at a distance from campus, even internationally. Many students do not have access to reliable technology and Internet services where they are. Shorter sub-lectures take up less bandwidth, and therefore place less stress on students trying to view them with less-reliable technology.

Now one might worry about going too far in breaking up the lectures like this: what if students are overwhelmed by the number of lectures, rather than by their overall length? To give an extreme example: it would be absurd to pursue this approach to the point of producing dozens of minute-long lectures every week. So where is the ideal balance? In my view, the answer has to appeal to average view duration—that is, how long students tend to watch each sub-lecture. I find that the five-minute mark is ideal: according to YouTube Analytics for my channel, the average view duration for sub-lectures that are

five minutes long or shorter is 60.6 percent; this drops down to 49.8 percent for videos over five minutes long, with a precipitous drop past the seven-minute mark. This is how I arrive at the breakdown of six five-minute sub-lectures per week. (Perhaps even 60.6 percent seems low, but this number includes rewatches as well, and students need not always rewatch the same sub-lecture from beginning to end every time). Granted, this may not work for all course content; but if the sub-lecture approach is to be taken, I recommend not going much over seven minutes for each one.

So much, then, for the means of reducing the burden of online courses. But there is also a need to supply scheduling and structure. I have supplied my asynchronous course with a regular weekly structure in two ways. First, I have included a section in the course syllabus called “What a week in this course looks like.” The section consists of a table with the days of the week, and suggestions for course-related activities on each day (with, of course, the added note that students are not expected to work on course material every day).¹² I have included this table in the appendix to this paper. Making a table like this involves imagining what a student’s side of the course will look like—never a bad idea. And it gives the students themselves a sense of what the course will look like week-to-week. Hence it supplements the more global picture of a course-long schedule of topics and readings with a more local and fixed picture of a standard week. The key, then, is to give students a regular weekly cycle that they can get into. In an offline class, this is supplied by a schedule of weekly lectures. In an online class, a snapshot of a standard week is a vital supplement.

Second, I have given weekly assignments, each worth 5 percent, which cumulatively account for 60 percent of the final grade. This is in keeping with Miller’s principle of encouraging participation “early and often.”¹³ It leads students to a regular schedule of coursework, and thus supplies the structure lacking in online courses, especially asynchronous ones. Moreover, this approach reduces the stakes of the individual assignments, so that students are not panicking last minute on a major assignment worth a significant portion of their final grade. This, I hope, will further disincentivize what Grijalva, Kerkvliet, and Nowell refer to as “panic cheating,”¹⁴ and will offset the anxiety produced by procrastination noted above.

One problem with weekly assignments is that the first week of the course occurs before the academic schedule’s course add-date, so a significant number of students who will end up taking the course are not enrolled by the time the first assignment is due. Now, I am not worried about having to grant extensions to incoming students. But I *am* worried about burdening students with a homework crunch right

at the beginning of the course, especially when the original goal was to give them a regular, relatively low-stress schedule.

Here, the TO-approach is to ask what the *specific purpose* of the first assignment is, and then to distinguish that from the purpose of assignments in general. Since the purpose of the first assignment is to give the course a recognizable structure and to encourage regular engagement from the get-go, the assignment itself can be made trivially easy compared with later assessments. So I made the first assignment a relatively trivial pass/fail exercise of (i) installing and registering the course software, and (ii) logging in to the course Piazza page and responding to a general question about the course itself. For example, in an assignment like this, students could respond in a sentence or two to the question, “What do you hope to learn in this course?” This way, students joining later on in the class will not be saddled with two full assignments right out of the starting gate.

In a moment, I am going to turn to ways of addressing the problems of alienation identified by Mann. But first, I want to describe the course Piazza page, which is going to figure prominently in addressing those problems. Piazza is like a forum: students and teachers can post and respond to questions, mark questions and responses as good ones, and post notes. I have allowed them to do so anonymously, for reasons I will outline below (§1.3.1). And I have assigned my TAs different days to monitor Piazza and answer student questions.¹⁵ A total of 663 individual questions were asked on Piazza in the duration of the course. The total number of follow-up questions and discussion points is 899. Of these, 481 are responses from me or the TAs, and the remaining 418 are from the (approximately 150) students. Here is a breakdown of student participation on Piazza:

	Mean	SD
Initial posts	2.8	5.6
Follow-ups and replies	5.8	15.6
Days online (out of 59) ¹⁶	48.1	35.5
Posts viewed	230.2	35.5

In sum: the average student asks about three initial questions, and has just shy of six follow-up comments and questions. The relatively high standard deviation for student follow-ups suggests that some students have their questions answered with little follow-up, whereas others seek out further discussion. Students view far more posts than they create, which implies that overlapping or redundant questions are being answered all in one place—as are questions some of the students might wonder about, but be too shy to ask. Best of all, students are receiving answers far more quickly than they would if they were asking

me questions over email: the average response time to questions asked on Piazza was a surprisingly low thirty-four minutes. In my experience, and in the experience of other teachers in the Department who also use Piazza, this is in large part thanks to student participation, which generally increases as the semester goes on. By the end of the course, about 47 percent of student questions were answered by other students, rather than by me or the TAs. Once this process takes off, the work of the teacher and TAs is often that of merely reading and endorsing student answers.

Giving students the ability to respond to each other in this way helps avoid alienation. As we saw, Mann identifies loss of ownership of the learning process as a main cause of student alienation. This problem is especially acute in online learning. How, then, can we encourage students to retake ownership of their learning, and to see it as a process to engage in, rather than a product to crank out? Students can answer each other's questions—and very frequently do. And, further, students who do not have the answers can take part in asking or answering the question by clicking “good question” or “good answer” on posts. This gives them new opportunities for participation, and draws my attention to questions that are puzzling several students.

Accordingly, this provides me with an opportunity to identify what an anonymous reviewer for this journal calls *themes of misunderstanding*. Often, students come upon the same stumbling blocks. In introductory logic courses, these are legion and well-known (e.g., the material conditional, vacuous truth of universals, donkey sentences, and so on). Spotting and addressing these themes comes down to a few things: (i) awareness of these traditional stumbling blocks; (ii) attention to patterns in student errors, both on assignments and on tests; and (iii) anticipation of student questions and concerns which might not get raised by every student who has them. Of these, (i)-(ii) can be promoted in an online course in much the same way as in an offline one: by prior familiarity of the field, and attentiveness to student performance on assessments, both good and bad. But (iii) is especially difficult to develop online. To address this problem, I use Piazza, assessing the relevance of questions that do get asked according to two metrics: how many views a given post gets, and how many students flag it as a good question. If a post gets a lot of either of these (or both), I can address it in a dedicated video.

Sometimes, however, I take a more direct approach: I encourage students to request follow-up sub-lectures on questions and discussion threads they find confusing, and post these lectures as optional. In these respects, online teaching is actually *better* than its offline counterpart: I can explore digressions in optional add-on videos in a way I could not in a traditional lecture; and I can distribute them to any interested

students in a way I could not if they were discussions after class or in office hours. Students who find these optional related topics and questions interesting can watch them at their leisure. Students who don't needn't. But in all this, students are being given the opportunity to take ownership of their own learning process, both by helping other students, and by asking questions with sufficient conceptual depth to merit an additional sub-lecture.

I want to linger on this last point, in light of the ownership problem identified by Mann: students who ask far-reaching questions are, in effect, getting their *own* lecture, which picks up on the problems they raised. Wherever possible, I make a point of using the students' own examples in these optional sub-lectures (with their permission), and of calling attention to what makes the question interesting and good. In this way, students are encouraged to see the lectures as something they have *possession* of. This helps to mitigate the risk of alienation.

This approach works especially well in logic, where aspects of the material are difficult not merely because they are abstract, but also because they strike students as counterintuitive. The classical logic we teach our beginning undergraduates is not monolithic (even if it sometimes seems that way), and it is often downright *weird*, especially compared with natural language reasoning. So I level with students: if they find certain aspects of classical logic strange or counterintuitive, this need not be a bad thing—on the contrary, it may well be a very good sign. In fact, many students rediscover important motivations for non-classical logics on their own. To my knowledge, the first to make this point is Storrs McCall, who published a questionnaire to be distributed to students beginning logic.¹⁷ In his findings, the responses he gets suggest untutored students come to introductory logic classes with a set of naive connexive notions in the back of their heads, before they get “corrected” by classical FOL. By the principle that “out of the mouth of babes and sucklings Thou hast perfected praise,” this fact counts as evidence for connexivity. QED.

Whether or not connexive logics are the way to go, McCall's insight is valuable: student confusion with classical FOL mirrors the guiding intuitions of many nonstandard logics (a phenomenon which merits further study of its own). For example, students often balk at the fact that constants *must* name objects in the domain (so that there can be no constants for non-existent objects like Santa or Pegasus). Very well: they are articulating an important intuition that motivates Free Logic, and so I can make a brief video giving an overview of how Free Logic works. Or, for example, students find the strictness with which we apply predicates counterintuitive: is everything in our domain either tall or not, with no boundary cases we could reasonably haggle about? Well,

this is a central concern of Fuzzy Logic, which can be set out in brief in an optional video a few minutes long.

The central message these videos are meant to send is this: if you think logic is strange, you are by no means alone. And finding it counterintuitive does not mean that you do not understand it—in fact, the opposite might be true. Further still, there are other fun systems of logic out there for you to dig into in the future. (But first you have to eat your vegetables, in the form of classical FOL). The general point is that the student is in a position to judge logic, and so she has a sort of ownership of it.

The foregoing practices likewise address the other sort of alienation identified by Mann, namely alienation to preserve identity: if a student is confused, her confusion might be a *good* sign, a sign of a deep intuition into the way logic could (or should) work. Further still, in order to address this latter kind of alienation more directly, I have been quite free in admitting my own struggles with the course material when I was in the students' position. As an undergraduate mostly interested in German Idealism, logic as a degree requirement seemed to me a strange and arbitrary and maybe even a bit cruel imposition. Hence I can relate to several students who are taking this course for a second time, having dropped out after a first attempt. The truth is, I dropped an equivalent course the first time I took it, too. And so, when students who are retaking the course email me to express their concerns, I tell them as much. Here is what I told one student, who retook the course after withdrawing from it earlier, and who emailed me to express concern at the outset of the course:

To be honest, I myself actually had to drop an equivalent course when I first took it as an undergrad. And now I teach it. Moral of the story: not doing well on the first go doesn't amount to a life sentence. You just have to put a lot of practice into it: it's more like a language course than it is like an ordinary philosophy course. Practice goes a long way! 😊

The response of anxious students to this approach has been overwhelmingly positive: doing poorly in a course the first time around is not an irreversible failure. In fact, it does not entail never gaining sufficient mastery of the subject to actually even *teach* it years down the road. And so a student's rough first go says nothing definitive about their actual ability. Viewed in this light, alienation as a means of self-preservation is not at all necessary—or even attractive.

Now not all students who have such concerns voice them. And so I have incorporated into the syllabus a paragraph under the heading, "How to do Well in this Course" (which I have included here in the appendix). As in the email above, I encourage students to think of the course as a kind of language course, which requires regular practice.¹⁸ My hope is that this will not only encourage engagement, but also that

it will take some of the pressure off students: no one expects to leave an introductory class in Spanish or German on the first day with a full and perfect grasp of the language, somehow arrived at by genius rather than practice. So why would they expect to understand, immediately and with no effort, an artificial language like that of classical logic?

I want to close this section with a discussion of the accessibility concerns I brought up at the outset. In my lecture videos, I make ample use of colour-coding to distinguish parts of what would otherwise be a mass of text or a formula—for instance, by underlining in different colours the different premises of a verbal argument, or by coding all the same variables or constants with the same colour. While this means of delivery is effective and well-suited to teaching online (since computers give us way more colours to play with than classroom markers or chalk), I worry about its effect on the visually impaired. This worry is twofold: students who are colourblind cannot always distinguish colours, and students who cannot see the visuals at all cannot learn from them at all. To address the former problem, I suggest using a colour palette that is suitable for colourblind viewers, and in general not to encode information with colours that is not also obtainable by other visual or auditory cues.¹⁹ And to address the latter, I have taken care to talk through the text I make use of in lectures, rather than merely to gesture at or refer to it. So instead of merely writing up text, I also make a point of reading it out loud.²⁰

Hearing impairment is another accessibility concern, and the main way I have addressed this is by adding subtitles to my lectures. This sounds time-consuming, but it need not be: many video-hosting websites like YouTube can generate subtitles automatically. Subtitles generated in this way are not always perfect, but they are often very good; and anyway, it is much easier to go through and correct a few errors in the text than to write new subtitles from scratch without the service of voice-to-text software. In fact, this is one of the main reasons I have opted to post my lecture videos to YouTube.²¹

Now I hope the practices and techniques I have outlined here will encourage student engagement, and discourage students from dropping out or resorting to less honest means of completing coursework. Still, dishonest means remain, and so we have to address them.

1.2. Academic Honesty: The Problem

Academic honesty poses special problems for teaching online. In a logic course like the one I am teaching, this applies to all assessments, because the range of correct solutions is relatively narrow, compared with other assessments in typical philosophy courses. To give an example, two derivations identical in form, constructed by two different students in the class, are by no means the product of academic

dishonesty. Indeed, most derivation problems have a relatively limited number of correct answers, and so students will often have the same answers.²² In contrast, the existence of two word-for-word identical papers on Kant or Schopenhauer is deeply suspicious.

But academic honesty on exams is a problem for everyone, logicians and Schopenhauerians and Kantians alike, since all of us have to proctor.²³ The old model of putting all the students together in a large gym or auditorium and having them write an exam together under the watch of examiners is presently unthinkable. The new model of teaching online has to address this.

Broadly, ways of cheating on exams fall into two categories: those which can be done independently, and those which require an accomplice.²⁴ Independent ways of cheating generally involve things like sneaking notes into an exam. This is a significant problem for online test-taking, since it is very difficult to proctor students who are taking a test remotely. There are two ways to deal with this: either to use an online proctoring service like ProctorU or, more cheaply, just to make the exams open-book. In my course, I opted for the latter: I made exams more difficult than I would if they were being written in a traditional exam-room, and allowed students to consult their notes and the textbooks, along with the lecture videos posted online. But I made it very clear that they were not to collaborate.

Now if students wants to go about dishonestly collaborating on an online exam, they have two options:

1. Top-down: one student writes the exam first, then gives out the answers to other students.
2. Peer-to-peer: a group of students write the exam together, coming up with their answers collectively.

I think (1) is always contrary to what we teachers want. As for (2), I am not negatively disposed to cooperation as a matter of principle: often, student collaboration is a good thing. But the problem is that (2) can collapse into (1) if some of the students in the group are giving out more answers than others. And if this is happening, there is no way for the teacher to know it is, or to prevent it. More generally, teachers should at least have the *option* of giving students separate exams, and so (2) is at least *sometimes* a problem.

1.2.1. Dishonesty Discouraged

As I mentioned above, introductory logic and certain STEM classes face special problems with copying answers, either by collaboration or by students working on their own, because the correct answers are few relative to the range of good possible essays written in response to a prompt. Still, there are some good practices to at least discourage

cheating, mainly by making the product of cheating more difficult to obtain, or less reliable, than coming up with an answer honestly. In what follows, I look at cheating alone, before turning to illicit collaboration.

If I were a student trying to cheat on a test on my own, I would likely begin by looking for the answer online. So, as a teacher trying to discourage cheating, I should write exam and assignment questions that cannot be answered by a Google query. The way I have done this is, for example, to provide natural language arguments and ask students to identify their form. Since I can come up with these arguments myself, I can be sure they have no counterparts online. Further, I have taken time to come up with questions that combine the concepts in a way that is less likely to be found online. Rather than testing students on their grasp of basic concepts A or B, I ask questions that combine notions involved with A and B that are not easily discoverable by looking at the online definition of A or of B. I have included two sample questions exemplifying these approaches in an appendix to this paper. I would consider them here, but they involve enough logic that describing them in any detail would take us off topic.

As for illicit collaboration, it is clear that similarities in written responses are, on the whole, easier to spot than those in short answers. The exams I set for the class were predominantly multiple choice, which is probably the most difficult format to spot illicit collaboration on. But since the exam was also open-book, students had other ways of finding the answers on their own. And if it is easier to find the answers in the textbook than to get them from other students, then the incentive to cheat is significantly reduced. Hence the problem of preventing illicit collaboration on multiple choice exams boils down to the problem of making collaborating harder than using the textbook.

Here's what I did: I jumbled the order of questions and their answers. On the course webpage, I divided the class into sections of about thirty students each, and then assigned each section a different ordering of the same test. So, for example, section 1's question 1 might be section 2's question 9. I then used the course's university website (Canvas) to shuffle the answers, so that section 1's question 1, answer A might be section 2's 9, D. Finally, I formatted the exam so that only one question was visible at a time to examinees, so that they couldn't scroll around to match up questions.

This approach does not eliminate the possibility of student collaboration. But there is a time-limit on the exam, and a good deal of time-consuming organizational work would have to go into determining which collaborators or answer-givers had which questions and in which order, especially since the questions are set to be visible only one at a time. And I believe that, based on these difficulties, it is easier

simply to look up the answer in one's own textbook and notes, rather than to cheat by collaborating.

In this way, the end of preventing cheating can be attained by making cheating useless or unreliable, or at any rate more difficult than honestly taking the exam. I do not present this solution as a perfect one, but as a direction to go in. And anyway, even in offline examinations, the solutions were not perfect either.

As for illicit collaboration on assignments, I have endeavoured to discourage sharing answers by making the assignments low-stakes: as I mentioned above, students in the course submit a weekly assignment worth 5 percent, and cheating for 5 percent is much less tempting than cheating for, say, 40 percent. Further still, setting up a Piazza page as a social hub for discussion of problems gives students an outlet for collaboration that is not mere dishing out of answers along the top-down paradigm of cheating I highlighted above. Students on Piazza are thus working together in a social environment, albeit one I and their TAs can monitor. And with this, we come to the problem of social presence.

1.3. Lack of Social Presence

There is an apparent weakness with the case for TO, as I have been setting it up here, that I wish to address. To wit: what about the social presence that is, to borrow Chris Calvert-Minor's term, a "key trademark" of the face-to-face classroom?²⁵ Here it seems the direct-replacement mindset of the MO way of thinking about online learning has an advantage over the TO approach, since social interaction is irreplaceable and is not a goal of a course, but a matter of its mode of presentation. On the face of it, the focus of TO on the end-goal of the course looks impersonal and cold, and cannot account for the necessity of social presence and interaction.

But necessity for what? Here it is important to ask why we value social presence and social interaction in educational settings in the first place. What is its end? Answers to this are manifold. Here are a few mutually-reinforcing ones:

1. So that tone, which is notoriously ambiguous in text, can be read as friendly. Otherwise, students might feel isolated, or even misread tone as hostile.

This is especially difficult. Anecdotes about students carefully parsing professors' emails (which are often brief to the point of curtness) in search of clues about tone are themselves almost campus proverbs. It would be detrimental to the ends of the course if students declined to communicate with their instructor out of concerns about the tone of response.

This is not just a problem for students: student feedback is important for teachers, too, if they are to address student concerns and questions. Indeed, we might generalize, and say that social presence is important in terms of feedback, i.e.:

2. So that the teacher can receive feedback in real time—e.g., through frowns and puzzled looks in the course of a lecture, etc.

A significant risk in online classes is that the teacher's teaching can become a one-way broadcast. And (1) and (2) are closely interrelated, since feedback runs both from teachers to students and from students to teachers. As Michelle Miller surmises,

In a traditional classroom setting, students' faces give you an instant read on confusion, disengagement, and other important problems. Students stop by before or after class to clear up muddy points or talk in-depth about topics that caught their interest, and the give-and-take of an interactive lecture gives you a good grasp of students' level of understanding, at least for the ones who speak up. Online, these interactions are usually heavily time-delayed and mediated by text, particularly e-mail and discussion posts—two communication formats that have a well-known propensity to misrepresent emotional tone.²⁶

Text-based modes of communication thus preserve relatively little of the original, offline communication. Social presence gives teachers a chance to catch problems in real time, and gives students more flexibility in approaching teachers. Further, it allows students and teachers to establish a rapport. Without social presence, there is a very real risk that teachers will seem like distant voices coming from the clouds, rather than as real human beings who can sympathise with students.

Generally speaking, then, social presence encourages student engagement and interaction—that is, we prize social interaction:

3. So that students will feel comfortable asking questions, and teachers can be confident they are giving meaningful answers.

Hence, (3) is significant for teachers in much the same way as (2): it allows ideas in development to be confirmed and, if need be, corrected. Further still, what a teacher thinks is puzzling or difficult about the material is often different from what the students find puzzling or difficult. Questions from students provide a way to catch and address this discrepancy in real time.

Reasons (1)–(3) are probably uncontroversial, though the list here is likely incomplete: I am sure there are other reasons to emphasise social presence, and I expect they would work along similar lines to these ones. But if (1)–(3) can be taken as representative of the *kind* of concerns we have about making up for social presence, they highlight an important fact: social interaction is vital precisely because it is *con-*

ducive to the educational goals of a course. Hence TO-thinking is what underlies the notion of social presence as well: not social interaction for its own sake, as between perfect friends in an Aristotelian sense (valuable as that is); but social interaction for the good of the course. So an emphasis on social interaction is not a special problem for the TO outlook at all, and indeed *presupposes* TO-thinking.

I want to linger on this point, and so I am going to suggest some TO ways of addressing (1)–(3). As we saw, since so much interaction involved in online learning is distant and accordingly text-based, tone is tough to read. For example, suppose a student requests a one-day extension because her computer broke. One could write, in response, something like the following:

Hi Ella,

That's fine. Let me know when you've submitted the assignment.

This might come off cold, or even annoyed. One solution to this problem is to write longer emails and postings, which are meant to come off in a friendlier way. So one could rewrite the foregoing as follows:

Hi Ella,

I am sorry to hear your computer broke, and I hope the fix is quick (and cheap)! Yes, by all means, take an extra two days, but please email me to let me know when the assignment is submitted, so that I can check it and update your grade.

This improves (or anyway disambiguates) the tone, but it is time-consuming and draining to write a lot of emails like this, especially for large classes.

My solution to the tone problem (1), then, is to use the 😊-sign. It is quick, clear, and solves the problem. So I would rewrite the message as follows:

Hi Ella,

That's fine. Let me know when you've submitted the assignment 😊

Now emojis like “😊” (or even “:”) on their own do not entirely solve the problem of tone; but they are quick and easy, and they go a long way.²⁷ In any case, TO-thinking has pointed to a promising way to address (1).

Social interaction to address (2) is a more difficult thing to think about in online contexts: the intermediate goal of receiving feedback (in its many forms) is to address student puzzlement and to anticipate questions that may never otherwise be asked. Most of this feedback is accordingly non-verbal, and so even a large synchronous lecture, in which much of class will not be visible to the instructor, poses serious problems. In any case, I take it that ways of addressing (2) will be applicable to (3), since students are more likely to semi-consciously

frown or look puzzled than they are to raise a question verbally. That is, for every raised hand, there are several puzzled expressions.

There is no perfect solution to these problems for online teaching, but there are workable ones. One way is to try to get students to ask more questions; and the way to do that is to address the reasons they might have a question (even one as simple as “What are we talking about?”) that they do not ask. So the question boils down to asking why students do not ask questions they need answers to.

1.3.1. Getting Questions, Giving Answers

Probably the most significant factors preventing students from asking questions are what Stowell, Oldham, and Bennett describe as “conformity and shyness.”²⁸ The psychological study produced by Stowell et al. is worth considering, since it points to a promising solution. The focus of their study is clickers: anonymous response systems, with hardware units allotted to each student, which allow students to vote in polls and ask questions in lectures. Citing a growing body of literature on the benefits of anonymous student response systems like these, the authors seek to determine the role clickers have in increasing student participation and variety of response.

The study specifically addresses anxiety, which prevents student participation, and pressures (real or perceived) to conformity, which reduce the variety of student responses and questions, especially on controversial topics. (The authors note that there is considerable overlap between shyness and anxiety, as measured by the Academic Emotions Questionnaire (AEQ) developed by Perkun, Goetz, Titz and Perry.²⁹ This is intuitively sound: student anxiety and shyness are not isolated phenomena). The findings important for the present paper are as follows:

- a. Students who register as shy or anxious on the AEQ felt greater comfort using anonymous means of class participation;³⁰ and
- b. Anonymous participation increased the variability of responses: students evidently felt less pressure to conform when they did not fear judgment from their peers.³¹

Hence use of anonymous means of asking questions or voting in polls offsets the effects of anxiety and shyness, and decreases conformity in student responses. None of this is particularly surprising, but it is useful both online and offline.

The question then becomes, How can we use these observations in an asynchronous course, in which there are no live lectures in which to use clickers and the like? The key takeaway from the study is that the *anonymity* made students feel more comfortable asking questions that they fear might be judged harshly by their peers. So the ques-

tion becomes, How can we incorporate anonymity into asynchronous online learning?

Pretty easily. I mentioned above that the course I teach has an affiliated message board on Piazza. Piazza allows anonymous posting: on each post and followup, students are asked whether they want to post anonymously. And students can toggle this from post to post: for example, a student can ask a question anonymously, and follow up with their name (or vice-versa). Following the findings of Stowell, Oldham, and Bennett, allowing anonymity should encourage students to post when they otherwise might keep their questions to themselves. And the numbers from the course page lend weight to this conjecture: of the 1,081 Piazza questions and follow-ups discussed above, well over half (60 percent) were posted anonymously. I take this to be a sign that students are asking questions they ordinarily might not bring up, as they did in the study just cited. (Though given the circumstances as of writing, with everything online, I do not—and indeed cannot—conduct a full study with a control group, so make of these numbers what you will).

Hence we can use Stowell, Oldham and Bennett's insights into what hinders student participation in order to encourage it. And this addresses (2) and (3), since it allows us as teachers to receive feedback on what students find confusing, and to answer questions as they come up. Further still, I think there is a way to use anonymous posting on a course page to address (1), since I can make special (optional) lecture videos to address problems students raise that lead to deeper philosophical puzzles. As I said earlier, I have received ample positive feedback from students who are excited to see their ideas being developed in a YouTube lecture, and creating such a video allows me to speak semi-directly to the students in a friendly and encouraging tone.

To give an example of these add-on lectures: students in logic courses often struggle with the notion of the material conditional, which in many ways does not work like the conditional sentences of natural languages like English.³² This is a traditional stumbling block in early logic courses—it is, to borrow Dorothy Edgington's memorable phrase, "Logic's first surprise."³³ On Piazza, one student asked why a conditional like "if people eat bricks, they will slur their words" would be true in a case in which a scientist gives test subjects vodka instead of bricks (rendering the antecedent false) and then observes them slurring their words (rendering the consequent true).³⁴ This objection is important and good, and also got a lot of follow-up comments and questions from other students. So, in response, I made a brief (about 3 minute) video outlining this question, and discussing how the notion of strict implication was meant to address this problem—and faces problems of its own. I then posted it to the thread. Hence although I cannot

always address these puzzles in real time (since in an asynchronous or hybrid course, the notion of *real time* is blurry), I *can* extend the (asynchronous) lectures to cover them.

Here's a final thought about technology, before I return to TO-thinking. It is a curious fact of human psychology that we more rapidly become frustrated with a computer that is not running smoothly than we do with less high-tech items like malfunctioning toasters or finicky lamps. Whatever the reasons for this fact, getting good technology, especially for recording lectures, is vital. Depending on the use of visuals, the need for high-quality video is variable. But high-quality audio is crucial, and good condenser microphones are relatively cheap. The onboard microphone on most computers is, in general, insufficient.

Speaking of which, an anonymous reviewer for this journal has pointed out that successful means-oriented (MO) approach can often be much more expensive, because it presupposes better technology and more technical support: a thirty minute TED Talk is roughly what a successful MO lecture would look like, and this requires much more equipment, planning and expertise (not to mention, in most cases, a live audience). Conversely, my course requires no more than the gear and support required to start up a vlog: a USB condenser mic (CA\$70), drawing tablet (CA\$100), and video editing software (CA\$220). There are cheaper options than these—and, conversely, the sky is the limit, as in all things. But it is important that of these, only the video editing software is vital for TO and not MO courses, assuming the latter are delivered live and synchronously, or posted as-is after recording. And there are free software options available, which work quite well.³⁵ In sum, TO-oriented online teaching has the added advantage of being cheaper to do successfully.

2. *Fruits of TO-Thinking*

Our focus here has been with special problems faced by online teaching, and with TO practices to solve them. Thinking along TO lines, we have considerably restructured aspects of course delivery to skirt the disastrous outcomes we would likely face if we taught online using the very same methods we developed offline. But TO-thinking has also turned up sound practices to bring back to the world of offline, face-to-face teaching. By way of a conclusion, I will enumerate a few of these.

Online tools give opportunities to allow anonymous responses and questions from students. And, following Stowell et al., anonymous feedback encourages students to ask questions they might otherwise keep to themselves out of fear of being judged by their peers. So even in a course taught in a conventional face-to-face classroom, setting up a message board for students on a site like Piazza will likely give teachers insights

into student uptake of course material—insights they might otherwise not obtain judging from questions asked in class or tutorials alone.

Better still, answers to these questions can be shared with students who might not ask them at all. This is a special concern for questions asked in office hours or over email—as so many are in online courses. I began to worry about this problem when, as a TA in offline courses, I noticed a redundancy issue: I frequently had to answer the same question over email multiple times. Often this happened because students felt too shy to ask their questions in tutorials. As a result, I would end up copying and pasting an answer into multiple replies, though it seemed likely that there were more students wondering the same things, who did not take to email to ask me. How can we get answers to these students as well, and do it all at once?

This problem points to a further use of Piazza: to answer unasked questions, and to drastically reduce email load. Here is how. I have made it mandatory to ask any curriculum-related questions on the course Piazza page, rather than over email. I then assigned my TAs different days to monitor Piazza and answer questions. Shifting the questions over to Piazza addresses two problems: first, students who might be too shy to ask will—I hope—feel less shy posting anonymously. And even if they do feel too shy to ask, there is a pretty good chance they will find the answer they were looking for anyway, since someone else will likely ask the question they had in mind. And so, second, if a student asks a question that has already come up, I or the TAs can link back to the original.

By my estimate, this practice has reduced my student email load by about 95 percent. Here is how I arrived at this estimation: approximately one in twenty questions students ask over email is not curriculum related. These are emails dealing with accommodations, extensions, and other things which it would be inappropriate to post in a common space like Piazza. Now that I am down to just these, I am down 95 percent. Granted, some of this is just offloading email load onto Piazza. But given the redundancy issue, my overall email load is still dramatically reduced. And I am using Piazza to make answers available to students who are otherwise too shy to ask. It is my hope that seeing other students ask the same questions, and even seeing those same questions merit optional add-on lectures of their own, will embolden shy students to ask more questions later on. This is a practice I will retain for my future teaching, be it online or offline.

In sum, our tour through online teaching gives us opportunities to discover new practices that will improve our teaching when we move back offline. If we are mindful of the *goals* rather than the *means* of online teaching, the new offline normal will be an improvement on the *status quo ante*. Such, then, are the fruits of TO-thinking.

Appendix

A. Sample Test Questions

In §1.2, “Academic Honesty: The Problem,” I suggested using questions on open-book exams which are not easy to Google, and which involve combinations of concepts. Here are two examples from the midterm I gave to my introductory logic class. The correct answers are in bold.

Question 1

Consider the following argument:

Maybe it’ll rain, and maybe it won’t. If it doesn’t rain, we should hold the picnic, because a picnic will make everyone happy. If we don’t hold the picnic, people will be sad. But if it does rain, we can always move the picnic indoors, and people will be happy with that. So we should go ahead with the picnic.

Which of the following best describes the structure of the above argument?

- A. **Proof by cases**
- B. Disjunction addition
- C. Indirect proof
- D. Analytical consequence
- E. None of the above

Remark: this question is not easily Google-able, since it involves a sample argument in natural language which I cooked up. So there is no way to enter the text online in such a way that the answer is clear.

Question 2

Which of the following arguments is unsound?

- A. All horses are mammals, and all mammals are animals; therefore, all horses are animals.
- B. All Greeks are mortal, and some Greeks are human; therefore, some humans are Greek.
- C. **No ancient Romans went to Mars, so no ancient Romans visited another planet.**
- D. Gold is expensive, therefore gold is expensive.
- E. None of the above.

Remark: Answering this question correctly involves thinking carefully about the notions of validity and soundness. Since all invalid arguments are unsound, and since (C) is invalid, (C) is unsound. The trick here is

seeing that, although both the premise and the conclusion of (C) are true, it is not valid. The reason it is invalid is because the truth of the premises does not guarantee the truth of the conclusion: just because the Romans did not go to Mars does not itself guarantee they never went to some other planet, e.g., Jupiter or Saturn. Consider an easier example: “I have never been to Spain, so I have never been outside North America.” Such arguments are invalid, and so they are unsound, even though the premises and conclusions are true.

B. What a Week in the Course Looks Like

Monday	Suggestion: study!
Tuesday	Item: office hours on Blackboard Collaborate (3--5 p.m.) Item: assignment due (starting May 12) at midnight EST; next assignment posted online Suggestion: discuss assignment questions with TAs
Wednesday	Item: weekly lecture posted online Suggestion: watch lecture, begin work on next week's assignment
Thursday	Suggestion: study: rewatch lectures, work on assignment, post any questions to Piazza, etc.
Friday	Suggestion: study!
Weekend	Suggestion: study! But also take time to relax :)

C. How to Do Well in the Course

Practice! A good deal of the coursework involves translating sentences from English into symbolic logic, and vice-versa. Furthermore, producing derivations can be made much easier by establishing a sound basis in the reading of symbolic sentences, and by developing techniques and strategies for arriving at the solution. All this requires considerable practice. Accordingly, it is a good idea to treat PHL245 like a language course, which requires constant practice and repetition in order to establish proficiency and confidence. If you want any further practice problems in addition to the assignments, feel free to do other problems in *LPL* and email me your solutions. I would be happy to look them over for you, and give advice where it's needed :)

Notes

1. See for instance Koo, “Logic as a Blended Course,” 139.
2. I have coined this term on loose analogy with philosopher of biology Marc Reshesfsky's term “homology thinking.” See his “Homology Thinking.”

3. This is more commonly *done* than *advocated*, but YouTube is packed with examples of lengthy lectures filmed in an empty traditional classroom. These are clear attempts to replace the traditional lecture's structure, content, and atmosphere directly.

4. Barker-Plummer, Barwise, and Etchemendy, *Language, Proof and Logic*.

5. Baron and Corbin, "Student Engagement."

6. Mann, "Alternative Perspectives."

7. Chipcase et al., "Conceptualising and Measuring Student Disengagement."

8. Baron and Corbin, "Student Engagement," 763; emphasis added.

9. *Ibid.*, 763–66. Baron and Corbin also note market pressures, including a trend toward treating students as (passive) customers or consumers, rather than as active participants in a community. I do not doubt that there is truth to this, but I am limiting my focus here to those things I can address in the design of an undergraduate course.

10. Mann, "Alternative Perspectives," 14; emphasis added. The parallel Mann is developing here is with the Marxian concept of alienation of labour, whereby laborers are separated from the products of their own labor. To give a simple example: if I work in a car factory assembly line, I never experience the finished product, nor the completion of the project, the way someone does who labors in a cottage-industry pursuit (e.g., knitting a sweater).

11. Note also that, if you are editing out pauses, you can pause as long as you like. Often I take a few minutes just to think over how I am going to present the material. In other words, since it gets edited out anyway, the length of the pause makes no difference.

12. This approach was suggested to me by Alex Koo.

13. Miller, *Minds Online*, 180.

14. Grijalva, Kerkvliet, and Nowell, "Academic Honesty and Online Courses."

15. Of course, TAs do not need to monitor *all day*: the point is just that by the evening, all the questions posted that day should be answered. In fact, students themselves very often answer posted questions before TAs do.

16. The course ran from May 7, 2020, to August 26, which marks the deadline for completing the asynchronous final exam. This is a total of 111 days—or fifty-nine, if we exclude weekends, public holidays, and university-scheduled study breaks. On forty-eight of these fifty-nine days, the average student visited the course Piazza page at least once.

17. McCall, "A History of Connexivity."

18. I came to this idea on my own, but it is admirably presented and developed by Katarzyna Paprzycka, "Teaching Logic as a Foreign Language On-Line"

19. Such palettes are readily available online. See, for example, Nichols, "Coloring for Colorblindness."

20. Getting used to this takes some practice. And, full disclosure, I have been doing it for a long time: one of my parents is blind, and I have worked weekly shifts at the Candian National Institute for the Blind for the past six years. Still, this technique can come pretty naturally, since many of us are accustomed to reading off what we write on the classroom board in a traditional setting.

21. Understandably, some teachers are wary about posting their lectures to public websites like YouTube. But YouTube gives options to restrict access, so that only view-

ers with a special link can access videos (unlisted), or even only those who have been approved (private). These settings are on each video uploaded, and are easy to modify at any time.

22. This is a pedagogical point, not a logical one. In principle, any derivation could be arbitrarily long, since there is no cap on the number of lines involved, or of uses of derivation rules; and the derivation rules include things like repetition and disjunction introduction, which allow us to repeat any earlier line in the proof, or to derive the disjunction $P \vee Q$ from P . But I have never seen a student go on using repetition or \vee -introduction indefinitely like this (why would she?), and so at least pedagogically there is a finite number of correct derivations.

23. I am setting aside the problem of plagiarism on essays, which is in general not a special problem for online teaching as opposed to teaching offline.

24. This observation is due to Melissa Olt, “Ethics and Distance Education.” Olt comments on the rather detailed list developed by Peter Airasian, Joseph Engemann, and Tiffany Gallagher in *Classroom Assessment*.

25. Calvert-Minor. Review of *Minds Online*, 323.

26. Miller, *Minds Online*, 29.

27. Maybe I’ll get some pushback against the idea of using emojis like “😊,” on the grounds that they are too casual, and therefore not appropriate to student-teacher interactions. But I disagree: as David Foster Wallace observes, the SNOOT (his term) who cannot move between any other dialects but formal Standard American English—and who accordingly speaks only formally—is actually linguistically *deficient*, in a way that has serious social costs: different dialects come with different in- (and out-)groups. Better to communicate, if possible, that my students and I are on some level in the same boat. After all, we are.

28. Stowell, Oldham, and Bennett, “Using Student Response Systems,” 135.

29. Pekrun et al., “Academic Emotions in Students’ Self-Regulated Learning.”

30. Stowell, Oldham, and Bennett, “Student Response Systems,” 139.

31. *Ibid.*, 139–40.

32. I take it to be relatively uncontroversial that the material conditional is not up to the task of representing all (or even most) natural-language conditional statements, and is better suited to the job in mathematical proofs that it was designed for.

33. Edgington, “Conditionals,” 386.

34. An anonymous reviewer for this journal has pointed out that at least some student concerns about the oddities of *if* stem from puzzles about ordinary language counterfactuals, which—unlike the material conditional—are not truth-functional. In such cases, it is probably enough just to point out to students that counterfactual conditionals are not material conditionals, and that we don’t study the former in introductory logic, and leave it at that.

35. For a list and discussion of these, see Pappas, “Top 10 Free Camtasia Studio Alternatives.”

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Boaz Faraday Schuman is a PhD candidate at the University of Toronto. He studies Latin linguistics, and the history and philosophy of logic. He also has a blog, New Normal, on the more technical aspects of organising online content and producing lecture videos, and a YouTube channel, Logic with Bo, https://www.youtube.com/channel/UCqT2cYRx9sG_hIFBX16IyZg. E-mail: boaz.schuman@mail.utoronto.ca.

