

The Online Education Controversy

Andrew Feenberg

The phrase “educational technology” is ambiguous. It usually refers to technologies employed by educators. But it can also mean technologies that do the educating. In this latter sense “educational technology” appeals to some of those who administer educational institutions and their allies in education departments, technology companies and government.

Here is a recent comment by William Brody, the retiring President of my old university:

“If you went to a Johns Hopkins class circa 1900, and you went today, probably the only difference would be today we have PowerPoint. It would look exactly the same. If you went into an automobile plant in 1900 and today, you wouldn’t recognize that you were in the same place. Almost every other aspect of society has employed technology to reduce the labor content needed to produce a unit of service. The labor content of a car is dramatically lower today than it was 50 years ago or 100 years ago....At some point higher education is going to price itself out of the market....[unless] you figure out how to deliver the educational content in a different way.... One thing about education and information is it costs a lot to develop and deliver the first copy of it, but subsequent copies are less expensive. So you can distribute the same material to different audiences. You can develop a course in Shakespeare for undergraduates, which is delivered in a low student-to-faculty ratio with all the interaction you want. But you could then develop the same course to give to larger audiences for an evening course.”

The refrain is familiar. The “Ivy League” and presumably “Oxbridge” too will continue to offer students the personal contact with professors that we all enjoyed when we were in college. But future students will not be so lucky. They may have to settle for an automated tutorial delivered over the Internet, with videos of “star professors” taking the place of lectures and “interactive” tests taking the place of classroom discussion. Perhaps underpaid “tutors” will continue to lead online discussions in some programs, but the old model of the university as a place of collegial intellectual life is doomed to go the way of the steam car and telegraph.

Brody explains the economics of all this in the passage I have cited. Education today is a performance and like other performing arts, its labor costs are high since each show costs as much as the last. In fact faculty salaries represent about half the cost of higher education. The promise of technology is the transformation of education into a decreasing cost item, like CDs or pencils. Initial investment in courses may be high, but the nth copy will be nearly free. Economies of scale will save mass education from bankruptcy.

But will it still be education? This is the question asked by many professors and students. Brody himself reveals the problem later in his discussion. He points out that we have no clear measure of productivity in education, so we have no easy way to know what to preserve and what to give up in technologizing it. This is a different from the manufacture of automobiles. Henry Ford had no problem identifying and counting the product at the end of his assembly line. But how can one compare a personalized education based on human interaction with an automated product?

One can of course test for the delivery of contents, but that is a contentious definition of educational output, not least because of arguments over what those contents might be: facts, theories, intellectual traditions, learning strategies, critical awareness? No similar quarrels

troubled Henry Ford. He once said you can buy my cars in any color as long as it's black. The basic reason his customers wanted a car was clear and simple: to get from here to there, and this Ford supplied as well or better than his competitors.

I was shocked to read Brody's remarks in the Johns Hopkins Magazine, especially since I was involved in the invention of the very technology to which he implicitly appeals. I was working at the Western Behavioral Sciences Institute in La Jolla, California when the director decided to create a distance learning system for executives based on a computer network. This was in 1981 and nothing like this had ever been done before. The Internet was closed to the public and e-mail was still new, used primarily in computer companies and a few university research departments.

In those days, when you signed up for a distance learning program you received a package of printed materials in the mail. You had no contact with other students or your teachers. We invented online education in order to add human interaction to distance learning. We found a proprietary network and a host computer running a computer conferencing program that resembled current web forums. We hired faculty from major universities, fascinated by the prospect of using a computer for the first time. Our program opened in January of 1982, but with only seven students. It had proven extremely difficult to recruit for a program so innovative almost no one could understand it. The faculty still had to send out readings by mail, but our students could discuss the readings online and discuss they did, generating hundreds of pages of transcripts each month. This communicative application of computer networks came as a surprise to both educators and computer specialists, although today it is routine. For a time it was quite famous. We even featured on the cover of *Fortune*.



This experience put me in touch with leading people in industry and government. I recall being invited to lunch in the early 1980s by a vice president of one of the largest computer companies in the world. He asked my opinion on the future of computing. I thought to myself, if this guy doesn't know and is asking me, a student of Herbert Marcuse, to tell him, then no one knows! It became clear to me that technology was highly flexible and unpredictable and not at all like the image of the rigidly rational system projected by admirers and critics of technology alike. In fact we were proving this point in practice. By creating the first online education program at a time when computers were understood as calculating and filing devices, we contributed to reinventing computer technology as a medium of communication.

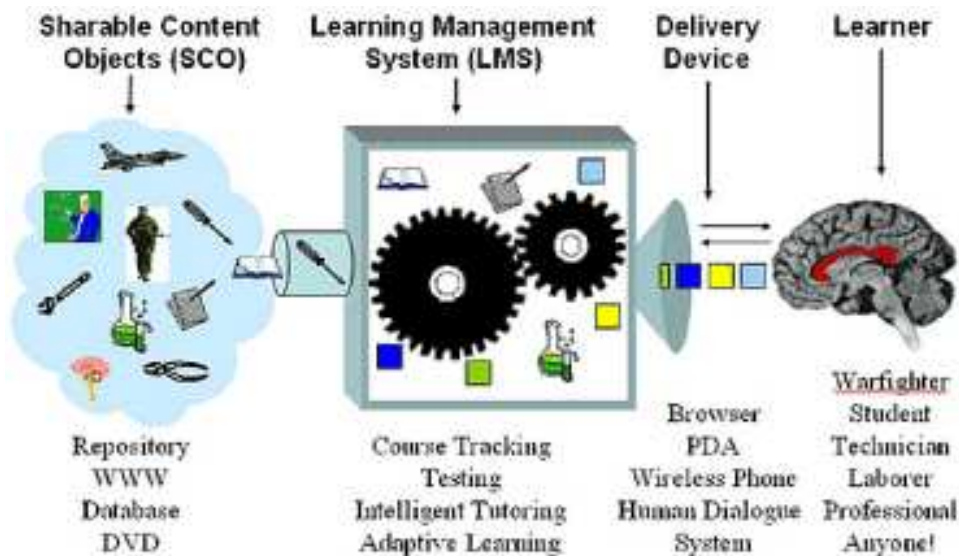
But there were many problems. The normal way in which one learns to teach is by being taught. Most people who have studied in a classroom have no difficulty performing the basic rituals of teaching such as facing the class to speak, recognizing those who raise their hands, using a blackboard, and so on. But none of our teachers had ever been in an online classroom and so they had no idea what they were supposed to do. Neither did we. It took a while to figure out how to initiate discussion and build interaction online but eventually we devised a dialogic pedagogy which became part of the culture of our school. Once students experienced successful online classes, they were impressed and spread the word about our program. We were moderately successful for ten years but never attracted the kind of support we needed to make a major impact and meet our costs.

From these experiences we learned lessons that are still valid today. Text-based online discussion is an inexpensive and effective pedagogical format that requires no special equipment and little training. We showed that effective learning can take place through interactive on-line education. Not always, of course—what pedagogy succeeds every time—but often enough for us to form an ideal of good practice. Using forum software, faculty in many universities have for years now brought the excitement of classroom discussion to an electronic setting.

Of course such on-line discussions are not the same as face-to-face interactions. There are losses, but they have their own advantages. For the instantaneous back and forth of real-time discussion, they substitute a slower but still engaging day to day rhythm. With time to think and compose questions and answers, students who might never have participated in a face-to-face setting bring forward their ideas. The use of writing imposes a discipline and helps focus thinking. Faculty learn to grasp students' ideas at a much deeper level as they engage with them on line. Innovative pedagogical techniques have been adapted to the Internet and new forms of interaction invented. In successful applications, small classes are the rule: twenty is a good maximum. From an educational standpoint, there is little doubt that well prepared teachers under good conditions can be effective at sustaining a true equivalent of classroom interaction.

Brody's remarks reflect a different view of the Internet's potential contribution to education. He is interested in automation rather than interaction. The project of automating education on the Internet follows a long line of initiatives beginning in the 1950s with Computer Aided Instruction, or CAI. CAI was delivered by the (ironically called) Plato system, and later by application programs running on personal computers. But it could never offer a really convincing substitute for live face-to-face instruction. At the end of the 1990s, many college presidents announced that the new multimedia features of the Internet could provide a more realistic

experience. This sudden enthusiasm for educational technology seems to have been due to a crisis in university funding. The Internet promised a cheap alternative to traditional education. Simulated interaction and video delivery of canned lectures, would add a little life to the sterile programs of earlier CAI.



Thus although they used the same words, what computer companies and college administrators understood by “online education” at this time was quite different from our pioneering program. The meaning of the term had slipped. Where we had added communication to a traditional distance learning system that lacked it, the new advocates of online education hoped to automate education on the Internet, eliminating the existing interaction in the classroom.

I recall a meeting at San Diego State University, where I used to teach. This was during a debate over the “wiring” of classrooms by a public-private consortium to which the university belonged. The Chancellor held an open forum with faculty to discuss many current issues of which this was one. I was unable to get my question in during the discussion but I stopped him on the way out and asked him to explain the pedagogy the investment in information technology was supposed to support. He looked at me coolly and said, “We’ve got the engineering plan. It’s up to you faculty to figure out what to do with it.” And off he went: subject closed!

Would you build a house or design a motor vehicle this way? Surely it is important to find out how the thing is going to be used before committing a lot of resources to a specific plan or design. Yet this was not at all the order in which our Chancellor understood the process. Why not? I would guess it is because he did not conceive of educational technology as an evolving system, creating novel pedagogical challenges that might be addressed in very different ways. Guided by the same assumptions about automation as President Brody, he took it for granted that “star” professors’ recorded lectures would soon be piped through his system while we ordinary professors faded out like Mr. Chips.

Of course the ambition to automate education provoked faculty rage on my campus. I recall feeling targeted by colleagues who blamed me for this monstrous assault on their

profession. I could only say, "It's not my fault, I lost control of my idea long ago." David Noble, the Marxist historian of industrial deskilling, became the principal critic of online education and he and I participated in several public debates on the virtues and vices of the new system.

In my contribution to these debates I attempted to place the issues in the widest possible context. This was necessary because I was fighting on two fronts, against humanists who dismissed all electronic mediation and technocrats who saw in it the promise of eliminating the teaching profession. Their values differed but their arguments converged in a deterministic conception of technology as a dehumanizing and commercially profitable alternative to traditional arrangements.

The philosophical argument over educational technology begins with Plato, 2500 years ago. One of the first such technologies was writing, and like every subsequent application of technology to education, it had its critics. Plato denounced the medium for its inability to recreate the give and take of spoken discourse. He has Socrates argue in *The Phaedrus* that writing is analogous to painting.

"The painters' products stand before us as though they were alive, but if you question them, they maintain the most majestic silence. It is the same with written words; they seem to talk to you as though they were intelligent, but if you ask them anything about what they say, from a desire to be instructed, they go on telling you just the same thing forever."

In short, Plato holds that the technology of writing has the power to destroy the dialogic relationship that ought to join teacher and student. Technology in the form of writing is the enemy of the human touch, a position familiar from critics of modern technology today. How often have we heard that technology alienates, "enframes" and dehumanizes, that technical systems intrude on human relations, depersonalizing social life and neutralizing its normative implications? Could it be that the humanistic bias against the computer goes back to Plato?

I agree with Plato that there is something about dialogue, and the active involvement of the teacher, that is fundamental to the educational process. Interaction should be woven into the design of every new instructional system. Any break with this assumption would amount to an epochal change in the communication between the generations.

As Plato sees it, the medium in which we communicate determines the quality of our interactions. Plato's critique echoes still in such famous philosophers as Martin Heidegger and Jean-François Lyotard. They identify the digital encoding of information in computers as the source of their dehumanizing effects. This argument culminates finally in the attack on online education for substituting computers for humanistic understanding. Ultimately, then, the question comes down to whether we can still defend an understanding of education like Plato's or whether the Internet, a more powerful technology than writing, has finally rendered his conception obsolete. Neither television nor stand-alone computers ever managed to accomplish this feat, but many believe that such possibilities await us just a few miles down the information superhighway.

But the notion that the use of computers somehow biases language and learning toward the strictly functional or technical is wildly off the mark. The deterministic hypothesis on which this notion rests has been refuted by the predominantly informal communicative usages of computer networks. To judge by the results users have had as much impact on computers as computers have had on users. In recent years we have seen that the social impact of technology depends on how it is designed and used. Writing can lend itself to ongoing dialogues between

teachers and students, and speech can easily become one-sided.

This argument opens the technical question of the design of computer systems in education. So long as the computer as such is to blame for the problems, design is unimportant. But if the computer is innocent, at least of the charge of dehumanization, then everything depends on how the systems are put together. Automation is one possible design agenda. We explored a different one at WBSI. I will discuss a variation on that alternative in my conclusion.

However, while Plato's condemnation of writing was unfair, he alerts us to a real issue: whenever a new educational technology is introduced, arguments emerge for substituting interaction with the technology for the process of intellectual exchange. And indeed the technology can be designed for this purpose. The issue of educational technology must therefore be framed in a broader context because it is not primarily a technical issue. It reflects the politics of education. It has to do with the relation of management and professionalism, which in turn concerns issues of career patterns, standardization, control, quality and the very definition of education. The resolution of these issues and the evolution of educational technology go hand in hand.

Although many faculty see no way to reconcile traditional academic values with the changes made possible by the new technology, we cannot simply dismiss technology as some are inclined to do. Since the early 1980s, more and more of our social life has gone on in cyberspace. This is true even of the humanistic critics of technology. David Noble's famous essay entitled *Digital Diploma Mills* circulated on the Internet.

Many social interactions that used to be face-to-face are now mediated. For the most part the mediation is written text, which has become a far more flexible instrument than in the past. So, we are now typing our identities and our relationships. This remarkable change has freed us from time and space constraints while making us dependent on computers, software and the corporations that own online services. Has our social world been colonized by technology and these corporations, or have we imposed our communicative imperatives on the technocratic order of computing? Will the very meaning of education be transformed to suit the limits of automated systems, or will educational technology be developed to serve something like education as we know it? As we will see, these questions hide deeper ones concerning the relation of technology to society.

The transfer of skills from craftsmen to machines is an old pattern that underlies the industrial revolution and continues through the Taylorist and Fordist developments of the 20th century. The industrial technical code aims to centralize control of the workforce and to lessen labor costs by substituting machines tended by unskilled labor for skilled labor. The automation agenda responds to this technical code.

The idea of lowering labor costs through a new division of labor is a child of capitalist manufacturing and especially of the industrial revolution. It was Adam Smith who first promoted it in his classic work *The Wealth of Nations*. He described the increase in productivity in the manufacture of pins through the division of tasks among the workers. His ingenious description of this innovation is commemorated on the British 20 pound note.

But the remarks of Andrew Ure are even more revealing. His book, "The Philosophy of Manufactures," explained the whole program in 1835. Back in those early days, it was easier to speak frankly without fear of exposing the embarrassing truth to alert critics. Listen closely and

you will hear the unspoken and no doubt unintended sub-text of Brody's message.

"By the infirmity of human nature it happens, that the more skillful the workman, the more self-willed and intractable he is apt to become, and, of course, the less fit a component of a mechanical system, in which, by occasional irregularities, he may do great damage to the whole. The grand object therefore of the modern manufacturer is, through the union of capital and science, to reduce the task of his work-people to the exercise of vigilance and dexterity."



Is such a gloomy version of the future of education really plausible? Is it likely that "self-willed and intractable" professors will disappear as have weavers, shoemakers, and typesetters, to be replaced by cheap unskilled tutors and online videos?

The ideal of automated education is no doubt still a minority view, but it has gained sufficient plausibility from advances in computing and the Internet to occupy a considerable space in public discourse. Its popularity is explained by the familiarity of the paradigm of replacing humans with machines. Other current buzz words such as "self-paced individualized instruction" feed into this trend. The essential idea is that in a future virtual university, accomplishment will no longer depend on contact hours, indeed, on contact with professors.

In the long run, should teachers be expelled from the classroom, we would truly enter a new era. One fundamental project of modern societies, the substitution of technical control for traditional methods, and devices for social arrangements, here overflows the sphere of

production to which it has been largely confined up to now and enters the realm of social reproduction. In this model the “disembedding” of the educational process, its disconnection from the local setting of the campus, is also its depersonalization. If human contacts are no longer central in so fundamental a growth process as education, then surely we are headed for a very different ideal of adulthood and a very different kind of modern society from the one we live in at present. But this is not a necessary consequence of modernization.

Ironically, contemporary theory (if not always practice) in the business world has left behind the industrial era’s fascination with deskilling. Starting with Peters and Waterman’s 1982 best seller *In Search of Excellence*, Frederick Taylor’s old model of deskilled labor and hierarchical management was blamed for everything that ailed American business. Since then the lesson has been hammered home in dozens of similar books devoted to exploring a third way, an alternative to the old opposition of “human” versus “machine.”

What we learn from this literature is the *complementarity* of human and computer capabilities. While humans are best at dealing with unexpected situations, responding to novelty, and dealing with ambiguity, computers can organize the vast amount of data required by modern production. Those companies prosper that choose technologies designed to get the best from both workers and machines. But it is also possible to use machines to replace workers in roles for which human beings are most suitable. There is a false promise of technology behind such strategies, the promise of total control. A similar false promise is at work in the vision of automated education. But complementarity is also possible: teachers can manage the complex and unpredictable communication process of the classroom, whether face-to-face or online, while data is delivered not only by textbooks as in the old days, but also by the network.

These issues resonate with the general question of the overall social impact of the Internet. Much recent discussion of the Internet emphasizes its promise of epoch making changes in our lives. This theme is familiar by now. The transformation and democratization of politics, teleworking and telemedicine, the convergence of entertainment technologies around new models of distribution, are some of the miracles promised by enthusiasts, while skeptics worry about surveillance and commercialism. Thus the debate is not limited to education, which is simply one among several fronts in the struggle to define the society of the future. The meaning of modernity is at stake in this struggle. One possible outcome is a society reflecting in all its institutions the logic of the modern factory, obsessed by efficiency achieved through mechanization and management.

But one can also envisage a very different outcome modelled not on the factory but on another modern institution, the city. The city is the place of cosmopolitan interactions and enhanced communication. Its god is not efficiency but freedom. It is not dedicated to the rigid reproduction of the same, the “one best way,” but to the flexible testing of possibilities and the development of the new. Not hierarchical control but unplanned horizontal contacts. Not simplification and standardization but variety and the growth of the capacities required to live in a more complex world. The Internet extends this urban logic in a radically new way.

The factory model of education is based on the functions individuals serve in systems such as markets, workplaces, and administrations. By contrast, the city model conceives of the individuals as bearers of a range of potentialities that surpass any particular functional realization. The definition of those potentialities occurs in aesthetic experimentation, ethical and

political debate, and technical controversies. The first view characterizes modernity as we know it. The tendency of this modernity is to replace human communication wherever possible by technical or bureaucratic systems that enhance the power of the few in the name of efficiency. Education, from this point of view, should be narrowly specialized and tightly controlled, both in terms of costs and content. Automated systems in which communication is restricted to the delivery of data and programs could serve this technocratic project.

The second view holds out the possibility of an alternative modernity realizing human potentials ignored or suppressed in the present society. Many of those potentials are specifically communicative and depend on the very practices regarded as candidates for cost cutting in an automated educational system. Furthermore, these potentials can only express themselves in a communicatively open environment. This vision implies a broad education for citizenship and personal development, as well as the acquisition of technical skills.

The question implied in the debate over educational technology is therefore: Which model, the factory or the city, will shape the future of education? Online education can serve either strategy in different technical configurations. Automated education is certainly possible although at the price of a redefinition of education itself. The generalization on the Internet of a more traditional concept of education centered on human interaction would facilitate participation by under-served groups and might raise the cultural level of the population at large. But it would not cut costs and eliminate the faculty.

It is still unclear which model will prevail in the future. The difficulty of automating education and the opposition to removing teachers from the classroom has resulted in an incoherent compromise. In today's online education we inhabit neither factory nor city but rather a confused combination of the two. Technologies introduced on the assumption education could be automated are instead employed by teachers in a variety of ways. Class sizes vary widely, sometimes attaining ridiculous numbers no teacher could be expected to manage with an interactive pedagogy. In some universities online classes are written by professors who never meet the students. The course is implemented by tutor markers who may or may not lead an online forum. The phrase "online education" has come to mean many different things, not all of them good. This chaotic implementation of online education is not likely to last but what will follow?

What is worrisome is that economic and political realities now look to play the leading roles in shaping the future of our technologies. Higher education seems increasingly enamored with corporate rather than professional models of organization. Bureaucratic evaluation systems have been introduced in Britain and support for the study of the humanities drastically reduced. In the United States, the erosion of traditional faculty status continues apace in innovative institutions serving adult learners, now half the students in American higher education. And in the US it is becoming more difficult to resist arguments against tenure, arguments that carry conviction with the public if not with most members of the university community. Even in Canada universities employ more and more sessionals in the search for "flexibility" and cost savings. In this context, there exists a great temptation to think of technology as a managerial tool for centralizing the university.

The quality of college education is at stake not in whether we use computers but in how we use them. This is the real problem distorted in the debate for and against technology.

Fortunately, how we design the new technologies is still an open question; the answer will decide which benefits and which limitations we end up with. Indeed, that choice will decide who the "we" are that peoples the educational institutions of the future, since our choices will define the future identities and roles of students and teachers. I would like to influence that choice and I invite you to join with me in doing so.

I want to conclude now by discussing the current state of my own research and design work in the field on online education. Over the past two decades, many researchers have written about the pedagogical potential of online forums for reflection, critical thinking, and collaborative learning. But a number of recent studies have found that there is a lack of deep engagement, and that students do not view forums as a space for critical discourse. No doubt some of you have had such unhappy experiences with your own online classes.

Why is this the case? Is the promise of online education a false one, or can forums be improved to promote active and critical engagement? I think the confused state of online education, caught between the very different agendas of administrations and faculty, is one reason for this state of affairs. On many campuses online education was touted as the wave of the future but turned out to be far less successful than expected. Administrations lost interest and abandoned it to the faculty without training or standards. Often vendors such as Blackboard are invited in to show off their wares and do the training. I have attended these training sessions. They offer instruction in such tasks as uploading files, but no discussion of pedagogy.

In my previous research I have argued that leadership or moderating is one of the key factors determining the quality of learning in online forums. This claim is supported by many studies. I proposed a set of moderating functions that are fulfilled primarily by the teacher but that can be more or less distributed among the members of the class. They include many activities we associate with leadership of discussion in a face-to-face context, such as raising topics, recognizing participants' contributions and summarizing discussion at key points. The effective performance of these functions initiates, sustains, and advances dialogue online as well as in the classroom.

These functions bear both social and intellectual content. They are not mere "process" techniques that could be implemented independent of the subject matter of the course. Only a real teacher can perform them effectively. But unfortunately teachers have very little guidance in getting started online and the technical environment in typical web forums does not facilitate moderating. The lack of adequate training and moderating may explain the failure of many forums to add much value to online courses.

What is more, widely used forums, such as those in popular course management systems like WebCT, Blackboard, and Moodle, are little different from the forums available in the early days of web-based online education. Indeed, apart from cosmetic changes, most current forum interfaces are quite similar to the original newsgroup programs from which they descend. They have no education specific features. Teachers who enter the online classroom with no preparation find themselves in an unstructured space. No wonder they often have trouble evoking intelligent conversation from their students.

I have been working for many years on the development of a forum design with specific features to support moderating educational discussion. I started this work after the debates with David Noble I mentioned earlier. It occurred to me that if technology can deskill labor, it can also orient its users toward acquiring and applying skills. But for it to have such an effect, it must

be properly designed.

In an attempt to address the pedagogical limitations of existing forums I developed a program called TextWeaver which has now been redesigned with the help of Geof Glass and Cindy Xin and renamed Marginalia. Marginalia is an open source extension to Moodle that adds annotation and several other features useful for enhancing online discussion. Annotation has gained a certain popularity on the Web. A number of studies have found it helpful for online learning but so far no one has designed an educational forum that includes it in an easy to use form. Ease of use has been our focus. By leveraging the popularity of Moodle, my colleagues and I are able to introduce many people to our software and the pedagogy it supports. The availability of many Moodle sites has enabled us to make a thorough test of the hypothesis that annotation and effective moderating can improve educational forums.

A full discussion of the software and its use would require a whole talk as long as this one. You can see the software on our web site (<http://webmarginalia.net/>). I'll give you the address at the end of this talk. As an introduction, I want to just focus on two features that have proven to be especially important. These features are annotation and the summary page.

Here is an illustration of a forum with annotations.

The screenshot displays a forum interface with a top navigation bar containing options like 'Display replies in nested form', 'Move this discussion to ...', 'Move', 'All annotations', and 'Summary Tags'. The first post, titled 'Why annotation?' by Admin User, discusses the limitations of existing discussion forums and introduces Marginalia. It features several highlighted phrases: 'All course management systems provide discussion forum as one of their key functionalities', 're-visitation', and 'education oriented discussion forum'. To the right of the post, there are two annotations by Geoffrey Glass: 'It's remarkable how little the forum medium has changed.' and 'Also, the forum tends to be isolated from other functionality.' The second post, titled 'Re: Why annotation?' by Geoffrey Glass, asks if it would be good to have the ability to annotate online and how to do it. It also has a highlighted phrase: 'education oriented discussion forum'. To the right of this post, there is an annotation asking 'Are there any unique technical features of forums focused on education?'.

Display replies in nested form Move this discussion to ... Move All annotations Summary Tags

Why annotation?
by Admin User - Friday, 2 May 2008, 01:07 pm

All course management systems provide discussion forum as one of their key functionalities, however, most of the existing discussion forums have limited capabilities to facilitate re-visitation of the forum archive, retrieving relevant information from it, and making active use of the information. This discussion explores Marginalia, a Web annotation tool that attempts to fulfill this goal.

Geoffrey Glass: It's remarkable how little the forum medium has changed.

Also, the forum tends to be isolated from other functionality.

Geoffrey Glass: Forums are like newspapers - current, but poor for ongoing stories.

Edit | Delete | Quote | Reply

Re: Why annotation?
by Geoffrey Glass - Friday, 2 May 2008, 01:20 pm

Wouldn't it be a good thing to have the ability to annotate online especially in an education oriented discussion forum? If so, how do we do it?

Are there any unique technical features of forums focused on education?

Show parent | Edit | Split | Delete | Quote | Reply

You will notice that each comment contains highlights and notes in the margin. The highlights and notes are added by readers. They are visible to all participants although notes can be hidden. The highlights mark the significant passages that interested the readers and the

annotations record reactions, appreciations, questions, and notes for later use in writing comments. The annotations form an abbreviated counterpoint to the more lengthy and carefully composed comments.

Next, look at the summary page. At any time members of the forum can call up this page which lists in chronological order all the highlighted passages and the accompanying annotations. The summary page is useful for getting a quick overview of the proceedings. It can also be mined for significant passages and ideas to incorporate in the periodic summary comments that help move the discussion along.

Showing annotations by anyone in [discussion "Why annotation?"](#):

Discussion: Why annotation?			
Re: Why annotation? by Geoffrey Glass	we come to conceptualize of public opinion is in two forms: the local, common sense and the positivist public opinion poll	how has non-local technology changed the significance and influence of these forms?	“ geof
	Habermas describes this sense of opinion as "a basically suspicious reputé among the multitude" (p. 89)	quote	“ geof
Re: Why annotation? by Cindy Xin	their ability to facilitate re-visitation is still limited	I would really like to see clean integration of forums with wikis, so that it would be easy to push text to the archive.	“ ○ x Me
	asynchronous discussion	A benefit of online education.	“ ○ x Me
	value-added ways	Ideas must remain in motion, always changing.	“ ○ x Me
Weaving by Geoffrey Glass	Making notes while reading creates an archive	Can be a social activity.	“ ○ x Me
	"weaving" comments	one purpose of Marginalia	“ geof
↑ source & author	↑ highlighted text	↑ margin note	↑ user

When we tested this software on classes we made a number of discoveries. Most students and teachers liked the new features and found them easy to use. Explaining the features tended to orient the participants toward effective practices. For example, participation depends to a great extent on recognition. If you make a remark in a face-to-face conversation and no one responds you are discouraged from making further remarks. The same principle holds online. But replying online is more burdensome than in a face-to-face conversation where even a little nod can suffice to reassure an interlocutor that her comment is appropriate and appreciated. Annotation solves this problem. It is almost as effortless as a nod and so stimulates discussion by making it easy to respond.

We were surprised by another aspect of the students' appropriation of our design: they responded to each others' annotations in the margin. This unexpected usage is no doubt due to student experience with twitter and text messaging on smart phones. It too stimulated participation and interaction.

The summary page is useful for preparing summary comments. The importance of these comments in online discussions cannot be over-estimated. It is easy to get lost and fall behind in the rather chaotic flow of comments that characterize most online discussions. Summaries pull things together and prepare for a restart of the discussion. They give the group a sense of accomplishment. Summarizing makes a good assignment too. The fact of having a summary page encourages the writing of summaries and helps to perform this rather demanding task.

It is of course impossible to transform a dull and listless group into an enthusiastic and intelligent class with a mere piece of software. But good software can help to give direction to participants in educational forums. Training in the use of the software can indicate best pedagogical practices that might otherwise be overlooked. It is my hope that Marginalia or a similar program will become a standard feature of forums used in education. This would be one contribution I would like to make toward the effective use of the Internet in education.