

Contents | **Radical Pedagogy (2002)****ISSN: 1524-6345****Hot Technologies on Every Pillow:
The Discursive Development of
Institutional Change****Torin Monahan**Department of Science & Technology Studies
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This article argues for the need to analyze discursive power in order to adequately understand technological change within institutions. This is demonstrated by following a specific controversy over mandatory laptop computers (“the laptop initiative”) at Rensselaer Polytechnic Institute. By juxtaposing an internal policy-making process with an external open debate, this article highlights how symbolic capital is mobilized across language contexts to stifle opposition and stabilize controversy. Ultimately, symbolic exchanges give rise to material outcomes such that the power to shape social practices is transferred from the mutable domain of discourse to the durable form of infrastructure.

Keywords: technology, discourse, power, controversy, protest, education

Introduction

I first received word of Rensselaer Polytechnic Institute's “laptop initiative” on January 25, 1999. A colleague had forwarded an email to me that conveyed a sense of decision-making completion on what would become a mandate for all incoming students to purchase laptop computers. Addressed from a faculty member in another department to a graduate student, the letter queried: “Can you tell me what software you anticipate students will need to have under the new laptop initiative to support Writing to the Web . . . Should we be trying to obtain Photoshop for all Rensselaer students, for example? Your advice? Thanks.” I filed the message away and made several inquiries into the specifics of this laptop scheme. At first faculty members and students

confessed ignorance or stated that they had only heard rumors. As students began questioning the laptop decision, however, information and debate spread like wildfire.

Rensselaer Polytechnic Institute's (RPI) "laptop initiative" offers a case study of how power is mobilized through language to achieve institutional change. Many theorists have written about the role of language in structuring hegemonic regimes of meaning and possibility (Derrida 1988; Foucault 1972; Bourdieu 1991). Still, not much attention has been given to the importance of language in processes of technological change.¹ Perhaps this is because the pedestrian nature of language deflects inquiry into the symbolic exchanges that give rise to material outcomes.

This article employs a narrative form to communicate both my incremental process of discovery and the gradual shaping of a discursive controversy over technological change. I direct attention not only to official pronouncements, but, following the research path set by de Certeau (1984), also to the heterogeneously rich and revealing elements of the mundane: emails, face-to-face interactions, questionnaires, town meetings, protest signs, committee meeting minutes, newspaper editorials, and so on. In this sense, I seek to provide a "thick description" (Geertz 1973), not just a summary of findings.

The first section of this article analyzes the use of language to stabilize controversy among faculty and administrators over RPI's laptop initiative. I refer to this as an *internal* controversy that occurs prior to widespread awareness of the project. The second part of this article analyzes the *external* or public² controversy between students, faculty, and administrators. It will be seen that language does more than mirror contestation – it actively constructs and stabilizes controversy and then masks evidence that controversy ever existed (for instance, after the closure of internal debate, public documents falsely claim unified agreement on the initiative). In both the internal and external spaces, inequity in linguistic capital serves an important function in determining outcomes; that is, logically sound and well-articulated arguments carry less weight than the institutional position of the person or group uttering or inscribing them.

I must stress that while this narration is temporally bounded and focused on a single educational context, this is an ongoing story that began well before my involvement with it, continues beyond this particular paper, and is part of a larger movement of technological change in education (Monahan 2001; Bromley & Apple 1998; Noble 1997).

Framing the Controversy: Press Release Documents

Official and public notification of RPI's laptop program surfaced in a February

5, 1999 edition of the campus newsletter *reView*. An article on the front page declared in bold print:

New Laptop Program Offers Boundary-Free Learning . . . The class of 2003 will kick off a campuswide laptop program that will be phased in over the next four years. All incoming students next fall will be required to buy laptops, and new laptop courses and enriched computing infrastructure will be added to support the program . . . (RPI 1999a)

This title and the first two sentences both announced the mandate of required laptops and defended the merits of such a requirement, thereby attempting to close the conversation or controversy before any had arisen. The hidden agency in this document raised immediate questions: Who decided upon this requirement? Who will be responsible for developing laptop courses? Are such courses pedagogically sound? Few of the faculty members I contacted were aware of any of these details. In technology studies terms, this controversy had been carefully “closed” prior to public announcement (Bijker, Hughs, & Pinch 1987).

The *reView* article continued by rationalizing the decision without offering support from existing studies: “Mobile computing offers students flexible opportunities for teamwork, increased ability to take advantage of simulation and other multimedia course materials, and continuous access to materials from their classes” (RPI 1999a). Importantly, this goal of flexibility for student learning blurred boundaries between work-space and leisure-space: the initiative would install network connections at “every [student] pillow,” provided that students lived in on-campus dormitories. Students would *learn* to accept the colonization of their personal lives by work demands.

The article, however, quickly shocked me out of my naive assumption that the bottom-line had to end with the well being of students. In addition to promising to keep students up to speed with new technologies, the article continued, the laptop program would reduce 700 on-campus computer workstations to 400 over the next three years. Additionally, this project would further RPI's goal of achieving a higher ranking on Yahoo!'s “most wired” campus listing, which was 5th place at the time but is currently 7th.³ A press release linked to RPI's homepage admitted as much: “Rensselaer has won numerous national awards for its innovative use of computer-enhanced instruction. The university is now initiating Mobile Computing@Rensselaer, a new laptop program that will enable it to extend its acclaimed instructional methods” (RPI 1999b). The reasoning behind RPI's crusade to be the number one technological college in the U.S. was clear: increased technology would bring increased publicity, which would bring more students, who would increase campus revenues while also attaining better paying jobs upon graduation.

The panacea recipe seemed simple enough: just add technology and mix. Several questions lingered though. Technological determinism – the idea that technologies constantly evolve of their own accord and human beings adapt to them – of the type rallied in this article must be false. The laptop program did not just spring into existence from the technological fount; it was crafted by administrators and educators. Given widespread social acceptance of the myth of technological determinism, however, it functions as a powerful rhetorical maneuver that is almost unassailable. Thus, the *reView* article's deployment of this rhetoric effectively insulated the entire laptop program from much initial scrutiny.

Internal Controversies: Analysis of Official Documents

Just days after the publication of the *reView* article, a faculty member handed me copies of the official proposal and proposal drafts for “Student Mobile Computing @ Rensselaer,” an appraisal of the laptop program by the Planning and Resources Committee, and the Faculty Senate Curriculum Committee minutes of the meeting where the laptop program achieved initial faculty approval. (I later uncovered some documents specific to the School of Humanities and Social Sciences (H&SS) as well.) It will be seen that the official proposal functioned as an institute-wide document arguing for total laptop implementation, whereas the H&SS documents addressed marketing and implementation strategies within this particular school. I will first review some key passages from the proposal drafts and then analyze the curriculum committee minutes, which offer the most visible display of an internal controversy.

The proposal for Student Mobile Computing @ Rensselaer, keeping true to the genre, simplified all issues for ready comprehension but little depth of understanding. For example: “Rensselaer is committed to a leadership position in the use of technology in education. The laptop program is an extension of this position” (RPI 1999c). This theme of leadership, which presupposed the threat of competition, recurred throughout the document and played an influential role in quelling faculty opposition. As with the *reView* article, this proposal listed many foreseeable advantages, and each of them emphasized conditioning students for the “on call” demands of their later places of employment: continuous access, increased engagement, and mobility.

The foreseeable disadvantages included “reluctance of students,” “difficulty of adjusting instruction,” and “difficulty of adapting all classes to the studio/laptop model.” In this proposal, the focus upon human recalcitrance or inability to keep pace with the technological world operated as an extension and naturalization of technological determinism. This is an interesting tone for a proposal to adopt. On the one hand no technological changes have been decided upon, yet on the other, human rather than technological deficiency has already been targeted for any possible degrees of failure. In other words, the

technology itself can never be blamed; it is neutral at worst and revolutionary at best. The question of the appropriateness of laptops for student learning of content was not addressed in the proposal.

In almost every way, the phrasing of this proposal indicated that the decision to proceed was already made. The proposal made no obvious calls to the readers for support. The message communicated was that support had already been given, or perhaps taken. For instance: “The laptop's configuration will change from year to year . . .”; “As Rensselaer phases this program in . . .”; “The current consensus is for a single Windows-based laptop” (RPI 1999c). This last example even alludes to an informed debate and consensus-building process that had supposedly already taken place. If such activities did occur, who participated in them? Who was represented and who excluded? I could never get straight answers to these questions even when I asked them outright (which I later did at a laptop “town meeting”).

Determining actors and their degree of involvement became even more slippery because faculty members were themselves gradually caught up or “enrolled” in this program as it gained momentum. One faculty member present at the Faculty Senate meeting where the program was rubber-stamped told me that it was presented to the faculty as a “done deal,” something that was already well underway and happening. Similarly, a “Strategic Investment Proposal 1999” for H&SS listed at least one faculty member that I know of as “Supervising Faculty” for “reengineering” laptop curricula changes, but this person was never asked if s/he wanted this responsibility. If this faculty member, who happened to be up for tenure, chose to contest the position, it would appear to others as though s/he were backing down from a previous commitment. In this example, we see the power of the printed word to constrain, if not control, human actions.

The formal proposal, strategic investment proposal, and laptop program appraisal documents were not without their rhetorical nuance, however. They employed arguments that anticipated opposition and admitted minor flaws within the overall plan. As already mentioned, the main proposal admitted disadvantages but limited them to human resistance or ineptitude. The program appraisal document stressed the need for a curricular plan prior to implementation: “to fully realize the expected [positive] impact further curriculum development is likely needed for classroom activities” (RPI 1999d). The same document also articulated a lack of foresight in the event that the program should fail: “Costs of terminating the laptop program were not calculated” (RPI 1999d). Laptop committee representatives later indicated that there was “no turning back,” so failure was not something they needed to take into account. Once the technology is in place, the instructors and students will bear the burden of *making it work*. Finally, these documents gave some attention to the special requirements of “high need” students, mostly minority students: “We will seek donations for support of computers for students of

high need” (RPI 1999c). In other words, at the time of this proposal, no failsafe mechanism was in place to ensure a non-discriminatory educational environment, but at least the committee acknowledged this potential problem. With the admission of minor flaws and the anticipation of possible oppositional positions, the writers of these documents employed a rhetorical strategy of “inoculation”⁴ (Barthes 1957) to defend the proposal from further attack. They then concluded with full support of the program. Proceeding at full-speed along the road of technological progress, the documents turned their attention to truly important matters – marketing.

The marketing suggestions found in the proposal for Student Mobile Computing @ Rensselaer revealed the first of several major contradictions that would continue on into the meeting of the Faculty Senate Curriculum Committee. In sum, the proposal stated that RPI must stay ahead of the competition by being the first to follow industry demands completely – or, RPI will lead if it can adapt to corporate structures better than other schools. In the proposal, the goals of education were subsumed within this rationale of leading by following, where the most valuable message students could learn is how to follow best. This implies, once more, that students should *learn* to pride themselves in adapting to employer demands. Note this logic in the marketing suggestions:

- Our goal is to educate students for the world in which they will find themselves – laptops are considered by industry to be an integral part of the toolkit.
- This investment is an investment in competence – not a toy or peripheral piece of equipment
- Laptops are *hot* – use them or be *not* hot...
- Flexibility and agility are key to success in the new century – laptops are useable virtually anywhere – pictures in all publications should reflect avant garde settings in which students are using their laptops
- Rensselaer continues to pioneer in the use of tomorrow's technology – this is the only place that you can apply, every step of the way, the new technology in settings that are real-world and incorporate both corporate, governmental and academic “third party” endorsements testifying to the use of these new technologies. (RPI 1999c)

In the first bulleted description, not even a token reference appeared to other possible purposes of education – wisdom, self-fulfillment, personal growth, critical thinking, civic responsibility, etc. This reveals an extension of the technological determinism argument used earlier. Human beings have no role in structuring their lives; they must simply adapt as best they possibly can to the technological, corporate, or other worlds that they find themselves within. Further, adaptation serves as an indicator of effective “leadership.” The second bulleted description builds upon this logic, letting faculty know that it is *their*

responsibility to make effective use of these technologies. The third description does not warrant much response except to note the binary logic permeating this document: either one succeeds or fails, leads or follows, embraces or rejects. This grammatical structure affords no room for compromise or for the incorporation of alternate viewpoints. The penultimate description reinforces the theme of student flexibility, and the final description recapitulates the leading-by- following theme.

Where the laptop proposal highlighted the market demands of industry for technologically savvy and flexible students, the H&SS Strategic Investment Proposal emphasized the need of the institute to appeal to the desires of its customers – students. For instance, laptops promised to provide “[a] significantly higher sense of satisfaction among students.” This satisfaction rating could then lead to increased student “retention” in H&SS. Through these documents, RPI is characterized as a center of commerce with a duty to please customers on both ends (industry and students). By noting this, I do not mean to dismiss the marketing requirements for educational institutions, but rather to draw attention to how the dominance of economic metaphors obscures and subsequently devalues other possible goals of education.

Each of the official laptop initiative documents made the assumption that information technologies will necessarily augment existing learning experiences. Since little research supports this assumption in any demonstrable way, the committee and the institute continued to proceed under the belief that adding technology cannot harm learning experiences and will probably enhance them. Faith that the core components of education could be distilled and transferred into the digital realm bolstered the laptop proposal and made it quite attractive from a budgeting perspective, for the automation of education, of which this is but one of the first steps, promises to save the institute money.⁵ Consider this passage from the H&SS Strategic Investment Proposal: “All of the relevant course materials will be assembled into a web-based data bank, and relevant projects and simulations will be designed that will maximize the utilization of the new laptops” (RPI 1999e). One does not need to dig too far to locate the presumed actors and labor outsourcing within this passive voice panoply: “The intent is to assign a doctoral student to spend a semester working with the three faculty teams.”

A quote from the minutes of the Faculty Senate Curriculum Committee clarified this point about the efficiency of automating or outsourcing the labor of education:

At the Board of Trustees meeting there was a discussion of the effect of introducing studio courses⁶ [which the laptop format is modeled upon]. We are increasing the number of students to where we are close to 4800 undergraduates. *At the same time we*

have decreased the number of faculty. This leads to a consideration of the efficiency of teaching in the studio format. The Board tends to think that the studio is a more efficient mode of teaching, while some of the faculty believe it is less efficient. (RPI 1999f, my italics)

Aside from the copyright, labor, and autonomy issues at stake here (Hess 2001; Noble 1997, 1998a), this perceived efficiency is predicated upon an untenable premise that learning in digitally mediated spaces can mirror learning occurring in physical environments. Such an approach of simplifying a problem to mere content transfer, ignoring “superfluous” details or noise, and then proposing a solution is consistent with engineering culture (Bucciarelli 1994), but what if the superfluous classroom details and noises constitute an integral element of successful learning experiences? As John Dewey (cited in Cuban 1986: 95) argued, students often learn more through the “collateral learning” of social interactions, material navigations, and unplanned events than through intended lessons.

Philip E. Agre, who has written extensively about computation and human experience, illuminates this common metaphorical conflation of electronic representations with reality. He calls it the myth of the “mirror-world” or of a belief that real-world experience can be captured and replicated precisely in a digital medium (Agre 1997: 36). Because computers have historically been modeled upon reductivist charts, which are abstractions of reality, their ability to represent experience remains removed to the level of simulacrum. In order to more accurately model human experience through computers, one must first negotiate, conceptually as well as physically, the intermediary stage of representation. The diversity of these forms of mediation between representation and reality demonstrates a complexity that challenges the oversimplified mirror-world assumption that informed the implementation of laptop-based learning. Experience cannot be transferred to the digital realm in the ways that the RPI laptop committee envisioned.

I do not suggest that the laptop committee was entirely unaware of the complexities of transferring education from physical to virtual realms. All the same, they played-up the rhetoric of technological and market determinism as well as the metaphor of mirror world representation in order to propel the proposal that they believed in, or possibly in order to convince themselves that they believed in it.

To follow out the rhetorical moves used behind the scenes to stabilize and temporarily close the laptop program, let us revisit the minutes of the Faculty Senate Curriculum Committee where initial approval was granted (RPI 1999f). It is important to note up front that several non-voting yet influential “guests,” such as the acting provost and the Planning and Resources Committee chair, attended this meeting and used their presence to intimidate

or otherwise persuade the voting members. One faculty member responded to the resource efficiency and automation argument quoted above by reminding the committee of its responsibility to students and cautioning against letting finances motivate their decision. To this, the chair of the Planning and Resources Committee, the very committee placed in charge of appraising the laptop program, responded that finances *were not* an issue in the decision: “by examining the financial issue and seeing that the costs and savings are about even . . . take[s] the financial issue out of the discussion.”

Next, in response to a question about adequate preparation for the move to mandating laptop use, the objection was stifled by waving the metaphorical flag of competition and leadership: “We will never be completely ready. There is an advantage to being out front. Once you decide, then more people will begin to move to the use of laptops.” Here was another contradiction in decision-making logic. First money was dismissed as being a consideration in the decision making process, yet the increase in reputation made possible by being “the first” to mandate laptop use was voiced as a convincing reason to proceed. Despite the incorrect details (RPI would not be the first, since it modeled its program off of one already in place at Wake Forest University), increased popularity, enrollments, and retention promised to increase revenues, so money was indeed a consideration. Now we have seen two apparent contradictions in the arguments for this decision: 1) RPI must lead by following, and 2) money is not an influencing factor, yet the money gained from popularity is.

Another contradiction surfaced before this internal controversy reached stabilization. A faculty member at the meeting who was worried about the pragmatics of the decision stated:

I am concerned that the perceived impact of the laptop program on the freshman year and the perception that the freshman year is ‘ready to go’ are not accurate . . . [in regard to most freshman engineering courses,] there is virtually no way that resources are available to switch [from traditional to ‘laptop studio’ formats by] next year . . . I am concerned that students will come in the fall of 99 and find that we are not ready for them to use their laptops. I am also concerned that there are not enough faculty that are ready to use laptops in the studio format. (RPI 1999f)

To this, the acting provost asserted his authority to artificially divorce laptop-from studio- based classes: “I share your concern with moving to studio, however we need to separate the studio from the laptop issue. Students use the computers in many courses that are not taught in the studio format.” This assertion directly opposed one in the original proposal that linked the two formats in order to argue for existing experience and expertise: “Studio classes and laptops are intimately linked at Rensselaer . . .” (2). When a disconnection

between the two formats furthered implementation, then one was declared; when a connection between the two formats furthered implementation, then an “intimate link” was perceived.

It is important to note that the effectiveness of this rhetoric was contingent upon the positional power, or what Bourdieu (1991) calls the “symbolic capital,” of those involved. Words do not carry equal weight when delivered by different people. Just in these minutes alone, we have seen demonstrations of a committee chair and an acting provost making statements replete with contradictions but nonetheless silencing opposition. With these influential *men*² in the room, even with the acknowledgment of existing unresolved issues such as classroom availability and curricular reform, the Faculty Senate Curriculum Committee passed a motion to endorse the laptop proposal. Importantly, those verbalizing opposition or concern were not outnumbered by those in favor of the proposal. Instead, the symbolic capital of those in favor and physically present outweighed those with reservations. Even though those most strongly in favor of the proposal were guests, such as the acting provost, and not voting members of the committee, I suggest the obvious: their presence influenced the vote.

External Controversies: Analysis of Student Documents

On the administrative level, closure had been achieved on the decision of laptop implementation. One would expect that focus would now shift to working out the technical and organizational details of implementation. While the laptop implementation team did move in this direction, one relevant social group, students, managed to re-open the debate and threaten the certainty of the decision. Outrage spread quickly throughout the student body at RPI. Protest first manifested itself at the oral level of the everyday: between students passing in hallways, eating at the student union, sitting in classrooms. Palpable discontent grew quickly, building momentum and force, and soon tangible manifestations of opposition appeared in the form of protest posters, newspaper editorials, and web-art. Within the span of two weeks, the typically conservative, politically complacent, and pro-technology student body challenged the “justness” of the laptop mandate and threatened to interfere with the implementation process. These students effectively re-opened the just-closed black box of laptop implementation.

Throughout this transition period from the administrative closure we observed in the Faculty Senate Curriculum Committee to the eventual closure on the student front, those in administrative positions deployed a powerful rhetorical force to keep the black box shut. Take, for example, these quotes from a widely posted questionnaire: “After four years of a pilot program, administration recently decided to mandate that every freshman have a laptop computer starting in the fall of 1999 . . . What are your questions and

comments about this program?” Students quickly noted the futility of engaging in this conversation: if the mandate was *already* in place, how could they question the decision? Furthermore, if they did pose other technical questions, they would effectively be granting their consent on the larger issue of the implementation decision. Nonetheless, some students posed constructive questions and were met with condescending responses: “[Question] Some people are concerned that this form of media will be distracting in the classroom. [Answer] We understand that this can be an issue. For all changes there are both benefits and drawbacks.” Period. This lack of serious engagement with student concerns backfired by drawing more students into the fray. In spite of institutional assurances (“PLEASE KEEP PARTICIPATING!!!! IT REALLY HELPS!”), the absence of sincerity or subtlety in these rhetorical moves simply added fuel to the fires of discontent – students felt even more disrespected and disenfranchised.

Student responses took four basic rhetorical approaches. The first appealed to the *political rights* of students to participate in decision-making processes; the second challenged the *pedagogical soundness* of laptop-encumbered (as opposed to -enhanced) education; the third emphasized *consumer rights* of choice (with students cast as the consumers); and the fourth argued for *student cooperation*, rather than interference, with the implementation process. Since this phase of the technological controversy offers the richest linguistic material demonstrating the role of rhetoric and power, I will supply several examples from each of these four categories and evaluate the effectiveness of each.

Political Rights

In the first case, students questioned the political process that excluded them from meaningful involvement in the laptop decision. As quoted in RPI's weekly newspaper *The Polytechnic*, the Student Senate “unanimously decided that the timing was not right” (Reynolds 1999). Others cautioned that the decision was rushed (Mutford 1999a). Next students blamed their elected representatives for not doing their jobs (McNeil 1999). Finally students questioned power granted to administrators and threatened administrators with retaliatory measures:

The difficulties for students begin to occur when they are [the] ones wronged. While there is a complete structure in place to deal with potential issues between students and faculty or teaching assistants, students have no recourse for problems with administrators. We expect and rely on the Institute's administrators to provide us with accurate, timely information. When this dissemination does not occur, these same administrators react with feigned surprise when the students don't accept their decrees unquestioningly.

. . . Had there been an open, honest flow of information between all groups involved, the resultant student petition and vote of no support from the Student Senate could have been avoided . . . If the students are not heeded by the deans and directors, and if Dr. Jackson [RPI's president-elect at the time] follows through with her “open door” policy, some administrators may finally find that their actions do have repercussions. (*Polytechnic* 1999a)

A belief in sound democratic representation underlied each of these attacks on the political structure and process. What these students failed to perceive, but other columnists quickly pointed out, was that RPI functions more like a corporation than a democratic body. Therefore, this laptop predicament provided students with an excellent opportunity to purge their idealistic notions of democratic process before entering into a hierarchically structured workforce. In short, this rhetorical move failed to resonate because of its basis on the faulty premise of strong university democracy.

Pedagogical Soundness

The second strand of student argumentation employed a research framework to question the efficacy and efficiency of laptop- or studio-based instruction. In effect, students tried to apply the criteria advocated within research settings to the laptop issue. They wanted to see demonstrated results that supported the laptop scheme. For example, “The school claims that studio classes will be better and even beneficial to the students. All I hear from my classmates [in trial classes] is why these classes are not helping that much [compared] to the regular lecture format” (Rao 1999). In the absence of “hard data,” peer perceptions held more credibility than administrators' assurances. Students also worried about the unavoidable learning curve for instructors to alter classroom practices and for departments and programs to adjust curricula (Reynolds 1999). Thus, students invoked the precautionary principle: do not proceed until certain of efficacy, efficiency, and minimized risks.

This research-based argumentative strand failed to effect changes in laptop policy for similar reasons to that of the democracy argument. First, students had misguided faith in the achievability of unambiguous data (hard facts) within social milieus. Second, students expressed a belief that social institutions, such as universities, would act intelligently upon such research data. If anything, research on organizations demonstrates the difficulty of sound judgment and learning capacity on this macro level (Lindblom & Woodhouse 1993; Morgan 1997). Both of these premises, however, misperceived administrators' view of the function of RPI, which was to maximize institutional profits and viability, not necessarily to increase student learning or augment educational experiences. The acting RPI president, Neal Barton, summarized this point nicely: “We are making the decision to go

ahead with the laptops based on our belief that the program represents the next exciting step that will maintain Rensselaer's recognized leadership in technological education" (Barton 1999). Being *recognized* as a leading institution carries all the weight in this sentence, not actually *improving* learning. To be fair to progressive-minded administrators, the institution itself operates under such market logic, making the placement of learning criteria over market criteria exceedingly difficult.

Consumer Rights

The third argumentative strand, that of consumer rights, strikes me as being the most intriguing rhetorical move by students. Because it utilized the same market logic that the institute did, it had a greater chance of communicating to administrators. The failure of this approach, then, provides some insights into the ways similar rhetorical utterances operate within and reify relations of power. Note the consumerist tone of these student examples: "No other business can get away with ignoring a customer so much as a college or Institute can . . . Only the sheer mass of customer-students has any chance of stopping the juggernaut that is the laptop program" (Colonna 1999); "as students, our only power is our money. We're customers to the Institute, and, believe it or not, when we express dissatisfaction by writing editorials, the administration must eventually take notice" (McNeil 1999).

No doubt if students had done more than write letters, and had organized in "sheer mass" and walked out or held extended protests, the negative press generated by these activities would have persuaded the Institute that the laptop program should be delayed. This power was evinced by the willingness of the entire laptop committee, along with the acting provost and acting president, to call a "town meeting" to quell student outrage. After all, if positive press is the modus operandi for the laptop program, negative press would liquidate the technological investment. We can conclude that despite the similar grounding in market ideology, the rhetorical moves of students embodied less symbolic capital than those of administrators: students required argumentation plus action in order to gain level ground in this power relationship. The mobilization to action was lacking, so the linguistic protest eventually collapsed under its own weight.

Upon reflection, this market-based strategy possessed the greatest potential to disrupt and reconfigure power relations between the institute at large and its students. Like a gambit played in chess, students almost precipitated a conflict that would have weakened the strategic position of administrators on this academic playing board. Predicting students' lack of commitment to combine their verbal protest with organized action, however, administrators declined the gambit, thereby ensuring RPI's safety and leaving students overextended and vulnerable. Vulnerable to what? To the violence of the market logic they initiated, reinforcing the objectification and commodification of students and

strengthening existing power inequities. If students perceive themselves as consumers purchasing certificates of education (as opposed to students actively learning), then it seems less egregious for administrators and faculty members to think of students as commodities produced for sale on the industry market. (Indeed, I have heard faculty members at RPI refer to students as “commodities!”) As Mike Cooley (1999:72- 3) and David Noble (1997;1998a) have pointed out, such factory models of the university, which are often reinforced through educational technologies, can atrophy learning opportunities while dehumanizing both instructors and students.

Student Cooperation

The final rhetorical approach taken by students advocated grudging cooperation with laptop implementation in the face of its perceived inevitability. This approach also adopted a tone of duty to subordinate oneself to one's superiors, almost as training for future workplace behavior. Thus, these articulations combined a simultaneous embracing and naturalizing of deterministic and hierarchic logics. For instance: “The laptop initiative is a done deal. I could beat that dead horse until the next one comes along, but what I'd rather do is see it done right” (Mutford 1999b), and “It was great that many students were quick to point out the program's faults and what should have been done differently. Unfortunately, many students ended their involvement after this first step . . . there are still plenty of ways students can positively effect [*sic*] the laptop program . . . Students can involve themselves in the implementation of the laptops through the student committee” (Pottle 1999).

Cooperative responses to the program assisted the administration in forcing closure (again) upon the implementation decision. I heard some students refer to proponents of this position as “traitors” or “puppets.” Nonetheless, students who sympathized with the program blurred the us/them boundary and attenuated student solidarity. Still, describing these students as co-opted individuals lured into the network of administrators overlooks the influence of cultural beliefs upon student opinion and behavior, or, as Escobar (1995) has theorized, the effects of dominant discourses upon constructions of the conceivable. The stance of acceptance and cooperation found its roots in such a dominant discourse of inevitable, autonomous, and positive technological development. Even supposedly objective newspaper headlines embodied and perpetuated this deterministic mind-set: “Despite objections, laptops forge ahead” (*Polytechnic* 1999b).

If anything, the fact of student opposition rubbed against the grain of dominant perceptions of technology. This opposition was even more amazing for its occurrence within the technology-rich context of RPI, where an ornate church on campus has been renovated to take on the function of a computer center – one might say that technology has become the new religion for these

students. Describing cooperating students as co-opted or enrolled also falsely strips them of agency. Dominant discourses or ideologies shape conceivable thoughts or actions, but these students still *acted* in ways they found correct or politically advantageous (those serving on implementation committees, for example, will likely reference that service on their resumes).

What explanations might we offer for objections to the laptop program by students who self-identified as technology enthusiasts? Paradoxically, one answer rests with the technological elitism of these students. As computer savvy as they were (Mutford 1999a), they found it offensive and insulting that administrators would deign to know what was in students' best interest. The strongest point of contestation centered upon the proposed operating system of these laptop computers: Microsoft Windows. A colorful underground protest movement known as the "Inanimate Objects Party" (IOP) opposed this choice of operating system with performative speech acts.⁸ They posted numerous protest-art flyers and banners at high-trafficked areas around campus: some depicted a check from RPI to Bill Gates, others a degree in "Bachelor of Windows," others simply decried "Unix or Death."

Similar but more pronounced acts of protest have surfaced at other campuses around the country: "at Humboldt State University in northern California, students demonstrating against the deal [between CSU and Microsoft for the development and marketing of on-line courses] altered the sign at the campus entrance to read 'Microsoft University,' a creative act of defiance which caught the attention of media around the country" (Noble 1998b). RPI students may believe in the inevitability of technological progress, but their depth of immersion within technological waters motivated them to react against the restrictive homogenization of computer code options. To administrators' surprise, this political passion on the micro-level of operating systems surged over to challenge technological determinism at the macro-level of laptop implementation.

Conflict Eruption: The "Town Meetings"

Vocal student dissatisfaction at RPI pressured the administration into holding a widely publicized (around campus), strategically organized, and well-attended "town meeting" to extinguish student unrest that had been fueled by the laptop initiative. Held on a weekday evening (March 1, 1999) within the student union, Neal Barton, the acting president of RPI, Jack Wilson, the acting provost, John Kolb, the dean of Computer Information Services, and others on the "laptop implementation team" positioned themselves centrally in front of a large screen which displayed powerpoint slides.⁹ Students were offered free refreshments as they listened impatiently to an amplified presentation by John Kolb about all the positive aspects of and the rationale for this laptop program.

Students became visibly outraged as the presentation advanced. They soon began interrupting, forced to yell their questions and accusations without the benefit of the panel's public address system. Students successfully derailed the panel's agenda through their angry interruptions and soon captured the meeting, turning it into a heated question and answer forum. Students demanded that microphones be brought to each audience member with a question and cited this lack of foresight in planning as ineptitude on the part of the panel: "if you can't even plan for the needs of a simple meeting," they queried, "how do you expect to succeed in something as complex as the campus-wide reconfiguration of instruction around laptops?" The verbal bombardment coupled with the panel's admitted planning mistakes and lack of data made some panel members squirm and others sit back silently with grim looks on their faces. Soon, the acting provost was the only one fielding any questions. What started out as a show of force on the part of the panel ended with public humiliation. Students concluded the meeting by insisting upon another such meeting after Spring break (two weeks after the initial meeting). The panel reluctantly agreed.

Two weeks passed without a single notice advertising the second meeting. Calls that my colleagues and I placed to Computer Information Services were met with ignorance: no one knew when or if such a follow-up meeting would occur. Students seemed to have blown-off some of their anger with the first meeting and acquired an air of disdainful resignation about the laptop program. Three weeks after the first town meeting, the personnel at Computer Information Services were *still* "unaware" of any follow-up meeting. On a whim, some colleagues and I visited the student union that night only to find crews from the three main television networks on the spot filming the non-event! I later found a single, handwritten scrap of paper posted to a board in the student union announcing the event. While little effort was made to inform students of the re-scheduled meeting (acts of direct mis-information were perpetrated if you take into account the phone calls to Computer Information Services), the same was not true, evidently, for the press.

At this second meeting, only John Kolb, a student representative, and the curriculum- planning sub-committee of the laptop program were present to field questions. The few students who did manage to get wind of this event and show up were quickly divided into groups according to their schools. Representatives from the schools sat at tables with the students in an informal, decentralized way and conversed with them about the program's relevance to each particular school. I overheard several school representatives confess that they knew as much about the program as the students did but that they were resigned to making it work. With only several dozen students in attendance, as opposed to over one-hundred at the first meeting, and with no central target to oppose (such as a distinct panel), the highly effective student opposition of the first meeting was dispelled before it could arise. The boundary between

“us/them” ceased to exist, and the potential protest fizzled right in front of the news cameras.

Postscript

RPI's laptop scheme was actualized in the Fall of 1999. While millions of dollars were spent to upgrade and wire classrooms for their use, the pressure to integrate laptops into courses through instructional presentations and group activities has faded away. No allowances were made initially to provide the primary instructors of undergraduates – graduate student TAs – with laptops for instructional use, and although some mechanisms are now in place to address this oversight, they are far from standardized or well publicized.¹⁰

During the first implementation year, students expressed dissatisfaction with their technological education through a range of tactical appropriations of the “ubiquitous” technologies: they played games in class, “chatted” with friends, answered emails, surfed the web, and otherwise *escaped* from classes that they found non-engaging (mostly large, lecture-based classes). Upon rare occasions, the time- space compression afforded by this hyper-networked environment was exploited in ways that catalyzed learning: students discussed content during class time with friends in different discussion sections of the same class, effectively taking advantage of the intimacy of small group discussions and the efficiency of large group lectures, simultaneously (Monahan 2000).

Currently students still express resentment at needing to purchase pre-specified laptop computers that go largely unused. I have observed that only about 10% of students bring their laptops to classes, even to information technology classes. The escape functions of the technologies are less employed now, but seemingly because the novelty has worn off, not because courses have qualitatively improved. Nonetheless, the laptop initiative succeeded in further technologizing the campus, and that technological infrastructure now compels mandatory laptop purchases in order to justify its existence. This technological system has become durable and tenacious, both in terms of material hardware and social practices.

This article has shown how actors mobilize symbolic capital and rhetorical strategies to stabilize controversy and form technological systems. Actors with a greater degree of symbolic capital utilized this power not only to enroll others but to silence those who opposed them. Now that symbolic exchanges have resulted in material alterations, some of the power to shape social practices has been transferred from the mutable domain of discourse to the durable form of infrastructure. Because of discourse's influential role in determining technological outcomes such as RPI's laptop initiative, greater attention should be given to it in future studies of technological change. Ethnographic methods, which focus on the everyday aspects of negotiation

and meaning-making, can assist in linking local discursive moves to larger political economies.

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Endnotes

1. Notable exceptions include Edwards (1996), Haraway (1997), and Bowker (1992).

2. I use the term “public” quite loosely here to refer to the campus population of students, faculty members, and administrators. I in no way mean to imply that the campus constitutes or represents the larger public outside its boundaries; indeed, lack of public awareness and responsibility is a major shortcoming of this technological institution.

3. The RPI press release for the Yahoo! “Most Wired” ranking can be found here http://www.rpi.edu/dept/NewsComm/Rensp_news/press_releases/yahoo99.htm. Current Yahoo! rankings can be accessed here http://www.zdnet.com/zdsubs/yahoo/content/100mostwired/table_uni.html.

4. Barthes (1957) describes this strategy as “admitting the accidental evil of a class-bound institution the better to conceal its principal evil. One immunizes the contents of the collective imagination by means of a small inoculation of acknowledged evil; one thus protects it against the risk of a generalized subversion” (150).

5. Langdon Winner (2002) develops a wonderfully disturbing satire, “The Automatic Professor Machine,” in order bring the efficiency and profitability arguments of educational institutions into stark relief: <http://www.rpi.edu/~winner/apm1.html>.

6. An RPI press release explains what “studio classes” should be: Studio classes combine classical learning activities, from lecture to discussion to paper and pencil problem solving to experiments, with hardware, computer simulation and experimentation. Students learn in a collaborative environment by doing and teaching others with help from the faculty. A key advantage to the studio format is that students can apply their knowledge immediately to experiments without having to wait a week or longer for a traditional laboratory course. (RPI 2001)

7. Masculinist approaches to decision-making are often perceived to be signs of leadership and strength at this still predominately male engineering school. Thus, it is not too surprising that men spearheaded this initiative and moved quickly to silence opposition.

8. The Inanimate Objects Party's (IOP) current web site can be viewed at this location: <http://www.inflatablewhale.com/>. Here is a sample of their poster speech acts against the laptop initiative (courtesy of IOP):



9. Picture of the laptop implementation team at the first “town meeting”
(Photo courtesy of The Rensselaer Polytechnic):



10. Under the laptop program, only undergraduate students are required to purchase the devices; graduate students are exempt.

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