Gendered Narratives of Innovation Through Competition: Lessons From Science and Technology Studies

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Library and information science is a technologically intensive profession with a high percentage of women, unlike computer science and other male-dominated fields. On the occasion of the 2011 ALISE conference, this essay analyzes the theme "Competitiveness and Innovation" through a review of social psychology and science and technology studies literature. Both theme concepts have ramifications for LIS education. Librarianship and teaching are both professions that resist commodification because they rely on embodied labor and personal interaction. Competition, as a management or learning style, may not promote meaningful innovation in LIS education, and instead risks creating a climate that is hostile to its chief demographic. The feminization of LIS can be seen as a strength insofar as it promotes the relative parity in numbers of men and women full-time faculty. LIS education should build on this strength in its innovation practices, enabling friendly encounters between technologies, and men and women alike.

Keywords: science and technology studies, self-determination theory, gender, technology, equity, education

Introduction

This paper will inspect the theme of the 2011 conference of the Association for Library and Information Science Education, "Competitiveness and Innovation," through a feminist science and technology studies framework. The purpose of this analysis is to tease out the implicit values of competition and innovation for library and information science education, and to open up some of the literature from the interdisciplinary field of science and technology studies for use in LIS. This analysis begins at the implicit notion that competition and innovation are a natural fit, entailing each other, and that therefore, competitiveness could be helpful and fruitful in an educational setting. The ostensibly quantitative, measurable, and hence objective concepts of competition and competitiveness stand in contrast with the qualitative, descriptive concepts of both "Culture and Collaboration," the previous year's theme.

I will then examine cultural accounts of technological innovation and progress in the context of pedagogy and librarianship. My analysis will draw on social psychology and sociological literature, as well as accounts of technological innovation from science and technology studies and feminist science studies, to reflect on aspects of education for librarianship that are resistant to the "measure, control, and automate" rationality of US-style economic competition. Particularly, I will:

1. Argue that competition and innovation are not causally linked, while analyzing and troubling both concepts.
2. Show that competitiveness and inno-

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vation are gendered in ways that make them troubling ideals for LIS and LIS education.
3. Make a case for an approach to pedagogy that is effective, appropriate to LIS work, and difficult to commodify.

There are some preliminary caveats: First, when we talk about the co-construction of technology and gender, we have to be careful to avoid essentializing. This means not taking apparent differences between men and women to be timeless, necessary, or inevitable; descriptions of the particular ways that competition, innovation, and labor manifest in our culture are not intended to be prescriptive. They are also statistical generalizations: not all men and women behave in the ways described. Additionally, the characteristics described in this essay are not presumed to be static and stable characteristics that happen in all times, all cultures, and all places, or for all people who are men or women. Rather, one of the purposes of this review article is to historicize and denaturalize the concepts of competition and innovation, and that includes the social configurations in which they arise. This is informed by Bowker and Star's (1999) pragmatist insight that "things perceived as real are real in their consequences" (p. 13).

Competition

I will start by examining the concept of competition. We typically understand competition as a sport or game with two or more opposing forces, ways of keeping score, and a clear endpoint that determines when the best rival has won. Competition is goal driven and rule-bound. Certain kinds of play are ruled in or out, and the criteria for winning or losing are explicit. This kind of competition tests the skill of players in relationship to one another. Sometimes competitions are between teams, and sometimes between individuals, and sometimes teams and individuals also compete against their own personal best.

The kind of competitiveness that the 2011 ALISE conference theme invoked shares some things in common with games of sport. Two or more actors attempt to solve a problem of some kind, and there are objective measurements of some sort that serve to score the outcomes, which means there are also end points or measuring points. Unlike games, which have relatively few clear and agreed-on measures (primarily score) and agreed-on end points, market competitiveness has a plethora of measures. The idealized measurement for market success is when the consumer chooses one product or service over another. Profit is the seller-centric proxy measure of consumer interest. In this idealization, the consumer is the judge of the best product or outcome, at the best price: an indexical measure of competitiveness and innovation.

Our idealized notion of competition as a generator of innovation black-boxes a host of processes for competition, including unfair practices, externalizing costs, marketing, deception, and deskilling. Hence, there is no guarantee that consumers choose the best products, or that the best products make it to market in the first place. And "best" is itself such a problematic measure: best for whom, in what ways? As these questions highlight, this kind of measurement can obscure unsavory elements of competition; for example, the extremely low cost of food in the US is underwritten by squalid labor conditions for migrant workers in agriculture. Scoring market success is not really about having the objectively best product. A given company might find ways to be profitable even when its product is not typically selected. Furthermore, the competition can be won not only by creating what others haven't, but also by stopping them from creating. In other words, competition is no guarantor of creating new innovations or knowledge.

Like a game, market competitions have winners and losers; this kind of competition is figured as a zero-sum game. In

addition to the market rationale embedded in the concept of competition, there is another register of the term, which is an evolutionary one, with individualistic and social Darwinist overtones. The term evolution is often used in an unscientific, teleological way. We might describe an individual as highly evolved, when we mean more intelligent, ethical, spiritual, or rational. But evolution is value neutral and non-teleological; there is no guarantee that culturally important qualities will be the outcome of evolutionary processes. Evolution fits organisms to their environments: if competition for resources and reproductive competition pressures require more stupid and less attractive organisms, then more stupid and less attractive organisms will be the winners of the game.

Innovation

Innovation is no less loaded a term. Innovation means making again, renewing, or the making of something new. In contemporary US culture, we often take for granted the assumption that competition assuredly produces novel solutions to professional and social challenges that will be tested on the playing fields that we call markets. Like competition, innovation is a word laden with cultural meanings, and in the current context, innovation implies technological outcomes and the changes that come with them. This invocation of innovation is a "form of wishful thinking that aims to bring about the desired transformations without the associated costs in time and human effort" (Suchman & Bishop, 2000, p. 332). But of course, it is not necessarily new technological products being innovated, but new processes or technologies for creating or packaging other products or services. This is not always beneficial. As STS scholar Judy Wajcman (1995) demonstrates, "capitalism continuously applies new technology designed to fragment and deskill labor, so that labor becomes cheaper and subject to greater control" (p. 191).

So while one important register of innovation is the marketing of consumer technologies, or using technologies in clever new ways, very often what is being created are processes that reduce corporate costs and increase corporate profitability. These innovations are by definition new but not necessarily better. For example, when the compositor's linotype keyboard was replaced with a typewriter-style QWERTY keyboard, a complex, male dominated field was reduced to a steno pool, which enabled women to compete for these now lower paying jobs (Cockburn, 1991).

Another concern with the concept of innovation in relation to competitiveness is the degree to which new products and services are necessary or rational, or the degree to which they present truly novel solutions to problems. As Suchman and Bishop (2000) argue, " 'innovation' can be understood as a construct activated in the service of what is, on closer inspection, a fundamentally conservative (in the sense of reproduction of existing orders) project" (p. 331). So much of marketing new products is about rendering older but functional versions of commodities obsolete. Sometimes this means merely repackaging an older product; the "new and improved" label on a box of detergent is a modern marketing cliché. Sometimes obsolescence is created through minor redesigns of consumer commodities. One novelty of the cell phone age is the purportedly free phone that comes with a two-year service contract. Of course, the phone isn't free; the costs are built into the contract. But every two years, customers will cast off old phones in order to receive the maximum benefit from the service contract that they would renew anyway. This sells more mobile phones, of course, but has important undesirable consequences for human rights, global trade in rare metals, and toxic waste disposal.

As this establishes, competition and markets are not value neutral. And innovation can produce damaging products or techniques, just as well as it produces help-

ful ones. This leads to one of the problems with the cult of innovation, and that is its relationship to technological determinism and optimism: the belief that the present social arrangements and technologies were the inevitable byproducts of historical development, and that any problems entailed in our technologies and their production processes can be eliminated with further technological innovations. As Sally Wyatt (2008) argues, "one of the most misleading and dangerous aspects of technological determinism is its equation of technological change with progress" (p. 168). But as Wyatt and many other sociologists of technology argue, this view "leaves no space for human choice or intervention and, moreover, absolves us from responsibility for the technologies we make and use" (Wyatt, 2008, p. 169). I will return to this point shortly.

Competition and Technology are Gendered

Not only are competitiveness and innovation not neutral or innocent concepts in the ways discussed above, but they are also gendered. Both sport and business—the two fields most obviously oriented around competition—are male dominated fields. Competitiveness and the technological savvy implicit in innovation are themselves markers of contemporary masculinity. Again, this is not an essentialist claim, but a description of the current social configuration. As Wajcman (1995) puts it, "The enduring force of the identification between technology and manliness is not an inherent biological sex difference. It is instead the result of the historical and cultural construction of gender" (p. 201). Or, to put it Melvil Dewey's (1979) way: "the boys have been trading jack knives and developing the business bumps while the girls were absorbed with their dolls" (p. 10). Dewey, however misogynist, seems to understand that gender is historically situated and performative.

This gendering has high stakes for library science. As we know from empirical studies, women in our current social configuration prefer not to compete. Although this is well established in the sociological literature, Niederle and Vesterlund's (2006) research offers more insight into the situation. In their experiments, they controlled for skill level while offering the choice to be rewarded by task or by tournament performance. Women chose competition half as frequently as men, even when skill and risk-aversion were controlled. Matched by skill, men were more likely to be overconfident in their performance than were women. As Niederle and Vesterlund (2006) argue, the fewer women who compete for jobs and promotions, the fewer there will be in these environments. Although there are multiple explanations for women's reluctance to enter competition environments, "anticipated discrimination" may be a factor in this preference. "Stereotype threat" is a related phenomenon. When people in marginalized groups are tested on characteristics that invoke negative stereotypes, they perform worse than when the challenge is presented in a way that avoids reference to negative stereotypes. For example, when primed with the idea that women perform less well than men on computer tasks, women are more likely to blame themselves than a computer failure for lack of success (Koch, Muller, & Sieverding, 2008).

Implications for Library and Information Science and LIS Education

Competition is clearly gendered. I will recount only a few instances from the immense literature in sociology of technology that surfaces women's long engagement with information and computing technologies (ICTs). A big part of the problem is that women's technological labor is culturally invisible. Katie King (n.d.), in her research on writing technologies, argues that when technologies are reduced to singular, stable, self-contained

devices, rather than assemblages, "work by women is made invisible in such metonymic reduction by definition. Thus 'technology'—reduced to what women do not do—becomes tautologically 'male' as it misrepresents the relational ecology of the worksite and the technical devices and skills employed there" (p. 59).

For example, in Ellen Balka's (2009) study of technologies in health settings, healthcare workers experiencing difficulties with a newly installed patient management system that was malfunctioning received subpar help from tech support because they were presumed to be using the system incorrectly. As Wajcman (1995) argues, "Men affirm their masculinity through technical competence and posit women, by contrast, as technologically ignorant and incompetent. That our present technical culture expresses and consolidates relations among men is an important factor in explaining the continuing exclusion of women. Indeed, as a result of these social practices, women may attach very different meanings and values to technology" (pp. 201–202). Paul Edwards (1995) corroborates this, arguing that "computers are culturally constructed in such a way as to stamp them with gender and make them resistant to the efforts of women to 'make friends' with them (p. 281).

But more than this, competition and innovation, alone and together, have serious implications for LIS and LIS education. According to the 2009 ALISE statistical report, 78% of students enrolled in an MLIS program in fall 2008 were women; this crept up to 79.5% in fall 2009, as shown in the 2010 data from ALISE. Although this suggests negative social forces that contribute to the feminization of the field (which I discuss below), this is a strong advantage over computer science and electrical engineering, insofar as LIS is a technology-centric field that has been seen as an appropriate profession for women. Whereas computer science and electrical engineering, like philosophy, physics, and film, have very small numbers of women PhDs, let alone tenured faculty, LIS has near parity between men and women in terms of full time faculty. LIS's very large female master's degree population has been a resource for an almost gender-balanced faculty. This is of course a problem of its own, given that in an unconstrained social world we would expect the gender and racial identities of those earning PhDs to mirror those earning MLIS degrees. Nevertheless, in comparison to these other high profile fields, LIS education has a noteworthy position in terms of educating large numbers of women to master, and hopefully innovate, ICTs.

The example of education in these high status and very masculinized fields holds insights about the pitfalls of these environments for women. Particularly worrisome is the declining numbers of women in computer science in recent years (Stross, 2008). Gains in undergraduate women's participation in computer programming have been lost. Although more women have turned to technically sophisticated work like web development, computer programming and engineering are disproportionately masculine (with an accompanying salary difference). But LIS remains a technology-intensive field that is friendly to women.

Problem Identification and Competition in Education

The demographic composition of these high-status, high-stakes fields matters deeply, particularly in regard to the issue of problem identification. Historians and philosophers of science like Sandra Harding (1991) argue that one reason why representation of women and people of color in the sciences is so crucial is because question setting happens and research agendas are formed from the standpoints of those doing science. This poses at least two problems for the question of competition and innovation in library science.

The first problem is about the kinds of

questions that will be amenable to solving through competition. Competition requires measures and endpoints at which to measure. Problems that cannot be conceptualized in this way, or which involve holistic, qualitative solutions, will be at a disadvantage for selection. If competition is the motor of innovation, then competitive work risks being about novel ways to turn a profit or increase market efficiencies rather than novel solutions to actual social problems. When competition and innovation are linked, then profit-generating solutions to social problems will be the ones that "win" whether they are best or not. For example, though malaria has long killed far more people than AIDS, it hasn't been given very much attention, because the people who are at risk are unable to pay for vaccines or cures. Malaria has been a third world problem. Only since one of the world's richest entrepreneurs, Bill Gates, decided to fund research has this dire issue been given due attention. So when we use competition as a tool to produce innovation, we must ask: what kinds of problems are likely to attract the attention of people who thrive in competitive environments? And what kinds of solutions will be considered acceptable and successful?

The second problem for library science is the perspective from which problems are identified and solutions generated. The presumption is that problems identified through competition and tested in markets are of universal interest and common good. Yet power differentiated groups are less able to participate in the measurement of their success (i.e., in the marketplace). And the research questions selected on behalf of marginalized groups may not be problems they would choose to study were they to design the research program.

This leaves crucial questions: What kinds of innovation can we expect to emerge from competitive environments, given the kinds of actors who are drawn to them and who succeed in them? What problems will be selected for research and development, given that competitiveness valorizes certain values and points of view while excising others? For example, Cowan (1983) shows that the development of new household technologies did not free women from the domestic sphere. Rather, it allowed women to enter the paid labor force while leaving the gendered division of labor in the home untouched. Domestic technologies developed by those who do not use them, as Cowan shows, actually entailed new levels and expectations of work, paradoxically extending women's work inside the home. In her study of early electrical communication, Marvin (1998) argues that "men . . . wanted control of all communication conducted through the technology that belonged to them. Rules of expertise that invested the knowledgeable with power over the less knowledgeable transformed stories of women's electrical ineptitude into homilies that justified men's control of women's communication" (p. 24). Nevertheless, Martin (1991) notes that women's use of the phone did not align with the male designers' intentions for it (p. 146). Co-opting it for their own purposes, women shaped the conventions for use of this early technology (p. 141). This is instructive to a techno-centric field that often seems to believe that women are afraid of technology, its own history to the contrary.

Creativity and Autonomy, and Sources of Innovation

I now want to return to an earlier claim I made about technological determinism, and that is in relation to the presumed link between competition and innovation. It is the dogma of the current age that innovation arises from competition. However, a body of research over the last 30 years levies a strong argument against this belief. The now large literature of self-determination theory convincingly demonstrates that the kinds of reward systems used to cultivate competitive environments actually take a toll on the kinds of creativity needed to develop novel solutions to prob-

lems. As the self-determination theory literature shows, people are more creative and happy when their work allows them to be autonomous, related, and competent (Ryan & Deci, 2000; Ryan, Bernstein, & Brown, 2010; Weinstein & Ryan, 2010). Autonomy is defined as self-willing, volitional, as being an agent in the action rather than being a "pawn" (Weinstein & Ryan, 2010, p. 223). The need for relatedness is satisfied through work that makes people feel close and connected to others. Competence is the feeling that comes from the opportunities to use skills, and to take effective action. When test subjects were offered rewards for solving problems, their interest in solving problems decreased, because their actions were no longer self-directed, but controlled by another. Ryan and Deci's research shows that rewards destroy curiosity and innovation, and that competitive, rewards-based systems lose their effectiveness when they are not applied to more basic, rote work.

Innovation in Action

Competitiveness has costs of its own and poses measurement and other challenges in spheres where processes and outcomes have been the name of the game, particularly in the traditionally feminized fields of education and librarianship. But even in the high status realm of technoscience, the best player is not always the winner. H. M. Collins' (1999) well-known study of the development of TEA lasers in the US and UK examines how scientific knowledge is transmitted through networks between laboratories. Although published accounts of how lasers were built existed, labs were unable to build them from these instructions. Tacit aspects of that specialized knowledge could not be communicated through publishing channels, even when scientists had every intention of transmitting that knowledge transparently. Labs that developed lasers required collaboration with other labs. While there was often a desire for some sort of knowledge exchange, networks of relationships played a necessary role in this innovation.

In his refinement of Thomas Kuhn's (1970) concept of scientific paradigms, Peter Gallison (1999) describes "trading zones" as a metaphor for understanding how cooperation between researchers enables new scientific paradigms. Physics researchers in the subfields of theory, experimentation, and instrumentation ratchet the field along, asynchronously, as "intercalated" series of paradigm shifts occur in one domain and then make their way to new domains, via "trading zones." Trading zones allowed collaboration between specialist subfields that benefited each specialty. In these localized opportunities for exchange, trading partners are not required to share the same meanings and purposes for the traded information in order to participate.

Our often teleological and deterministic understanding of scientific progress is deconstructed in a case study from chicken virology by Hans-Jörg Rheinberger (1999). Although Peyton Rous discovered what turned out to be viral chicken sarcoma in 1911, his project was shelved as interests in oncology and virology changed. Half a century later, Albert Claude won the Nobel Prize for his work in virology. Only then could Rous's work be understood as part of virology. Retrospectively, the development of this research looks like a continuous trajectory, but the trajectory was actually discontinuous and ruptured. The fact that we have invented or discovered something makes that development seem inevitable, but things could always have turned out some other way. That is evident from Cowan's (1985) famous study, which explains "how the refrigerator got its hum": the electric refrigerator became standard in US households even though gas refrigerators were silent, more durable, and generally superior. As Cowan puts it, "The machine that was 'best' from the point of view of the producers was not necessarily 'best' from the point of view

of the consumer" (p. 214). Other apocryphal examples of technological victories that defy the belief that the best competitor wins include the well-known case of the battle between VHS and Betamax video technology, and the QWERTY keyboard (Bowker and Star, 1999, p. 14).

I want to give one more example from science and technology studies. Not only is competition not a guarantor of innovation, our cultural belief in it can obscure other explanations for innovation. Alison Wylie's (1999) study shows how archaeology's enshrined belief that male-centered hunting activities dominated prehistoric caloric intakes made it difficult to generate plausible hypotheses for the transition to agriculture. It wasn't until archaeologists began accepting evidence that the gathering activities of women were crucial to the survival of prehistoric people that archaeological evidence could be interpreted in relation to this transition. Women's leading role in the development of agriculture—arguably the most significant innovation in human history—could finally be detected.

Gendered Division of Labor

Having now established that innovation and competition do not entail each other, and that our notions of technology connote masculinity, I want to turn now to the particular work of library science and education. At the core of people-centric work like library science and education, is the sense that the person offering the service cares enough about the person being served that she ensures a positive outcome in a way that is sensitive to the feelings and perceptions of the person being served. Arlie Hochschild (2003) calls this management of feeling "emotional labor," and her fine-grained study documents the ways women are called on to manage their and others' feelings in a way men are not (p. 178). Feminized work that involves care of others is underpaid, and the skill that makes it successful is invisible, because it is believed to emanate naturally from appropriate women's bodies. Organizations often "seek ways to buffer their customers from the rougher edges of competition and rationalization," relying on skillful employees to "fill the gap between old and new, taking up the emotional labor of 'service with a smile', or 'total customer satisfaction' " (Suchman & Bishop, 2000, p. 330).

Successful education and mentorship depend on this skill, which, like household labor, is difficult to account for in "competitive" economic analysis. But, as Hochschild's study shows, the work is often done in hostile circumstances because those being served have higher expectations for this kind of skillful management when women are providing the service. Bowker and Star's (1999) case study of nursing work speaks to the invisibility of this labor as well.

Care work marks a feminized profession and position, no matter the sex of the worker. Technology is positioned in our culture as rational and precise and therefore masculine and unemotional. The emphasis on (silicon-based) technological skill in the last two or three decades can be seen as a bid for status by denying the feminized and second class aspects of library work, while emphasizing the masculinized connotations of ICTs. This bid is paradoxical because the labor of care is at the core of library work, whether or not that work is read through a lens of "customer service." And the bid is anti-female because it fails to properly understand that interpersonal labor is in fact work, and that it is essential to the negotiation between expert users—librarians—and their clientele.

This is what Susan Leigh Star (1999) calls "articulation work": the labor necessary to make technologies fit together seamlessly. As Star demonstrates, "Information systems . . . may leave gaps in work processes that require real-time adjustments, or *articulation* work, to complete the processes" (p. 385). In fact, few technologies fit together seamlessly; con-

flicting proprietary standards, and layers of old and new software and hardware, mean that every system is an assemblage. There's usually someone behind the scenes doing articulation work that makes the fit invisible, or seamless. In the case of LIS, all sorts of invisible work goes on to get patrons hooked up with the materials they need.

In her essay on the conditions for objectivity in high stakes techno-science, Donna Haraway (1991b) argues that we must take responsibility for our enabling conditions, including our technologies, which serve as prostheses, or enabling technologies (p. 249). If we are to apply Haraway's insight and think of technologies as significant prostheses, we can see that the work of librarians is primarily work that hooks up people with their technologies. Not only do librarians articulate technologies so they work together more smoothly, they help people adapt technologies to their own individual and collective uses. The articulation work required of library workers is both technological and affective, rather than competitive.

Pedagogy

As I have noted, innovation does not just produce new commodities, it creates new ways to decrease the costs of commodity production and distribution, essentially by suppressing labor costs, typically by deskilling, so that more vulnerable labor pools that command lower wages can have the chance to compete in the labor market. In Haraway's (1991a) analysis:

> To be feminized means to be made extremely vulnerable; able to be disassembled, reassembled, exploited as a reserve labor force, seen less as workers than as servers; subjected to time arrangements on and off the paid job that make a mockery of a limited work day; leading to an existence that always borders on being obscene, out of place, and reducible to sex. Deskilling is an old strategy newly applicable to formerly privileged workers. (p. 166)

Education has been difficult to commodify, and remains labor intensive. But innovations in online education are creating inroads in the deskilling and commodification of teaching labor (Lewin, 2010), and we see some of the consequences of that in our changing language. Course curriculum has been renamed course content and teaching is now called delivery. Whereas publishing and photocopying have long enabled the reuse of course materials, and correspondence courses have been around for at least a century, video technologies and now the internet allow the most crucial aspects of teaching, face to face, interpersonal relating, to be captured and reused, enabling new depths of commodification. These forms of instruction are arguably very helpful for the traditional demographic of LIS students: women who, in heterosexual marriages and the primary caregivers for their children, are seeking a career change. Because the mobility required to move to a university and attend full time is substantially and disproportionately not available to these women, distance education opened the possibility of an advanced education for a meaningful career for people who otherwise are socially constrained from doing so. It is worth noting that most library work satisfies the psychological needs for autonomy, relatedness, and competence identified by Ryan and Deci (2000), which makes it attractive to women and men both.

At the same time, technologies for online education also have some negative consequences. While online education allows students to take on a course of study while out of phase with the space-time of the institution or instructor, it does not improve pedagogy itself. Rather, online education creates new labor burdens that must either be absorbed by the instructors or shifted off onto students. It makes some kinds of academic labor vulnerable, particularly when it is unclear which materi-

als belong to the instructor and which to the institution, or when veteran instructors are paid to produce "course content" that will then be administered and managed by less expert and more exploitable course assistants or adjuncts.

Optimistically, what we learn from reworking education with new technologies is about the aspects of excellent pedagogy that resist commodification. Particularly, teaching, like technology, is always a relationship, and that relationship is undergirded by the labor of care. This labor is embodied labor, and although technologies can facilitate that labor, it is time and energy intensive. As Hochschild (2003) demonstrates in her classic study of flight attendants, affective labor is literally vital to the successful delivery of other kinds of services.

The insights generated from Ryan and Deci's work on self-determination theory are also at the core of Alfie Kohn's work on education. Kohn (1999) has long argued that reward systems, like the reward systems supposed to spur innovation through competition, actually backfire and harm students' learning. We must be on guard against educational strategies that make LIS education look like No Child Left Behind.

None of this is to say that competitive play has no place in LIS pedagogy. Rather, what is at issue is how we conceive LIS education as a project. As the foregoing analysis indicates, innovations whose central purpose is to decrease program costs by reducing the amount of time available to instructors for mentorship and for qualitative (and labor-intensive) assessments are ideological. The affective labor needed to translate challenging material to students who can then "make friends" with both technologies and theories should be affirmed and protected in LIS education. This means that the kinds of conservative innovations, as described by Suchman and Bishop, that seek to make schools of library and information science more financially competitive at the expense of pedagogy that is relational and expert can be challenged and rejected. LIS educators can shift the narrative of innovation; for example, internet technologies can be used provide rigorous, asynchronous learning and mentorship, or they can be used to decrease labor costs, but they cannot do much of both simultaneously. In short, LIS educators have the choice to model respect and appreciation for the kinds of labor that will be needed for effective work in the collaborations in which MLIS holders will be expected to thrive—between co-workers and clients. Insisting on the necessity of embodied, engaged teaching labor is necessary for producing creative and critical thinkers who are able to invent and innovate, and who, in turn, will be competitive on the MLIS job market.

Conclusion

Librarians and library educators alike are facing deskilling and de-professionalization under the intertwined guises of competitiveness and innovation. I have shown that competition and innovation are ideological concepts that are also gendered. Avoiding essentialist responses, I argued that the stakes in library science are high because it is a feminized profession. I have challenged the idea that there is a causal connection between competition and innovation; I have also provided evidence that approaches that support relatedness, autonomy, and self-direction would be more helpful for spurring innovation in LIS, and would inform more appropriate pedagogical strategies. Additionally, this review essay offers an entry point to literature from science and technology studies that would be useful for both LIS research agendas as well as for LIS curriculum. STS literature provides theories of technology in society and methods for those who wish to move beyond the clichés of technological determinism. Finally, I have argued that teaching and learning are importantly relational, and that both knowledge and the affective labor needed to help

students acquire it resist commodification.

Is competition one way of spurring solutions to problems? Yes, it is one form, and sometimes a useful one, for generating problem solving. However, for competition to be a useful strategy, it has to happen in a larger context of cooperation and collaboration. Competition it is only one strategy, and a problematic and limited one at that, in an array of helpful styles for innovating and learning. Library science practices successfully put all kinds of people and technology together. This is a home team advantage that could inform strategies in the LIS education playbook.

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