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Introduction

Librarians have long recognized that access to the digital commons has the remarkable potential to neutralize factors that divide the rich and the poor. While access to the digital commons is free, the financial costs of the equipment and the lack of training in the use of the equipment is an obstacle to many people using this unique resource. The disparity in the allocation of this training and equipment is often referred to as the Digital Divide. Librarians continue to work diligently to bridge this divide by providing access to computers and conducting classes in the use of computer technology. By doing so, librarians continue to open access to the digital commons among the poor and technologically challenged that would not have been possible otherwise.

While access to the digital commons is burgeoning, it is not without significant problems. Greco and Floridi (2004) have recently pointed out that unchecked growth in Internet access will cause a significant reduction in the quality of the digital commons. As more users gain access to the digital commons there is more competition for bandwidth which contributes to frustratingly slow connection speeds, and finding the information one wants is rendered more difficult because of the proliferation of information added by members of the commons. This difficulty puts librarians in a problematic situation: We are forced to either let the market decide who has the equipment and training necessary to gain access to the digital commons, or we remain a constant factor in the qualitative destruction of this valuable resource.

Tragedy of the Commons

Is this reduction in quality inevitable? Greco and Floridi argue that it is. They argue that there is an internal logic at play which they call the Tragedy of the Digital Commons. The Tragedy of the Digital Commons draws its name from a problem identified by Hardin (1968). Hardin's insight was that people do not share resources they hold in common without some external force making them share. To exemplify his insight Hardin has us imagine a common pasture open to several herdsmen. Each herdsman wants to maximize his own gains from the pasture with as little cost as possible. So, it makes sense for the herdsman to introduce as many cattle as he can afford because he reaps all the reward from raising the cattle, i.e., selling the cow at auction or selling its milk, and suffers only partial costs because the grass that is eaten belongs to everyone equally. However, as every herdsman has the same incentive to maximize their own number of cows, the pasture is quickly depleted of grass and no one benefits.

A similar problem occurs as a result of bridging the Digital Divide. Training people in computer technology and providing Internet access gives more people access to the information commons. It is similar to Hardin's example above, in that it is like recruiting an endless number of shepherds to share the

common pasture. However, unlike the scenario that Hardin imagines, the digital commons is not ruined simply because people use the resource. In the digital commons there is no scarcity, as there is plenty of "space" for everyone. Rather, the problem in the digital commons derives from pollution. As more people use the commons and the pollution problem becomes more pronounced; the individual user experience is diminished.

The type of pollution is twofold: First, there is the problem of too many people vying for bandwidth at the same time. Without voluntary or coerced cooperation users do not limit their time spent online or the amount of information downloaded and uploaded. This free-for-all makes the service less usable for everyone. Secondly, we have what is created and "left" in the commons. This includes Spam and computer viruses which intentionally take up a vast amount of bandwidth, but also the copious amounts of web-pages, both personal and professional, that one has to sift through when looking for information on the Internet (Floridi, 2002). This type of pollution is easy to deal with on a small scale, but on a large scale it makes the documents we are looking for much more difficult to find.

The source of the problem for the digital and physical commons is, as Hardin correctly recognized, lack of cooperation. Cooperation can come about in two ways: either cooperation is forced by an outside authority, or it is voluntarily accepted by the members of the community. Hardin concludes that forced cooperation is the only feasible solution to the Tragedy of the Commons. Like Hobbes before him, Hardin does not believe people are altruistic enough to look past their own self interest to the interests of the community. So, Hardin advocates a strong central authority to ensure strong penalties for those who do not cooperate.

Models of Cooperation

A centralized authority does not work for regulating the digital commons. Centralization only works in closed systems where the members allowed into the community are regulated (Schmidtz, 2002). The centralized authority can establish rules for participation and exclude those members who do not abide by the rules. The digital commons, on the other hand, is an open system where members come and go of their own free will. The openness of the system is its greatest asset, but it also makes the community impossible to control.

The only alternative is for the members to voluntarily cooperate. Voluntary cooperation is only possible when incentives are sufficient to guide behavior towards cooperation. In other words, one must benefit more from cooperation than from following one's own self interest. Unfortunately, the conditions of the digital commons make the incentives for not cooperating heavily outweigh any gains that might be had from cooperation.

First, each user reaps all the gains from the use of the digital commons, while the harm created is dispersed over the entire community (Johnson, 2003). This creates an incentive structure that essentially negates the harms generated from falling on the individual user. In addition, users have no incentive to alter their behavior. If the individual user decides to decrease their bandwidth usage, this simply creates incentive for other users to increase their usage. The end result is we have a system that encourages over use and discourages cooperation.

An analogy may bring this into perspective. Pollution created by automobile use is problematic because of the large scale use of automobiles, not the use of individual drivers. Each individual driver derives great benefits from driving while faintly contributing to the air pollution problem. However, any individual driver cannot solve the problem of air pollution on their own, only large scale abstention will solve the problem, which requires a cooperative scheme that is absent in tragedy of the commons scenarios. Since each individual driver derives a great benefit from driving and there is no benefit from altering his/her behavior, each driver has an incentive to continue driving which results in massive air pollution.

The incentive structure for the digital commons works in the same manner. Things like slower connection speeds and the added difficulty of finding information resources are felt equally by all members of the digital community. If a few users modify their behavior by downloading fewer files the problems will remain the same because only significant modification of behavior will attain noticeable results. Each individual has no incentive to modify their behavior and every incentive to use the commons to their own benefit.

Information Entropy

The unrestricted use of the Internet leads to what Floridi calls *information entropy* (Floridi, 2002). Information Entropy is any activity or process which restricts or limits access to the digital commons. Decreasing bandwidth as a result of spam or overextended use of the digital commons are examples of information entropy. The Digital Divide itself is a source of information entropy, because the lack of equipment and training acts as a restriction on access to the digital commons. A healthy information commons is one that is open to everyone and clear of all obstacles that prevent access to the contents of the digital commons.

The question is how do we achieve a healthy information commons and avoid information entropy? Floridi advocates an ecological approach to the digital commons that pays special attention to the various roles the digital commons plays in our economic and social lives (Floridi, 2002). As with the environmental movement, an "ecological digital ethic" calls attention to the fact that the health of the digital environment is essential for our happiness and prosperity. This “digital ethic” will have us invest in an adequate infrastructure for connectivity, will have us invest resources in bridging the digital divide, and will have us take precautionary and punitive measures against individuals who intentionally pollute the commons with spam and viruses.

These are important steps to take, but it does nothing to assist with pollution left in the digital commons. As mentioned above, the proliferation of information within the commons acts as a restriction on the use of the commons. Even with an adequate infrastructure and vast reduction in viruses and spam introduced into the commons, there is still the pollution of the vast number of web pages left in the commons. These web pages, which form the foundation of most communication that takes place in the commons, are a principal source of information entropy.

Information Literacy

Information literacy is the key to dealing with this type of pollution. Instead of treating the pollution as something that must be controlled and regulated, as is the case when we treat it like an environmental problem, we can instead learn to work around it. The great advantage to information literacy training is that we circumvent the traditional responses to tragedy of the commons scenarios because we do not need to rely on any cooperative scheme. Rather, through information literacy, each user is competent to navigate and avoid the pollution left in the digital commons. The key to avoiding information entropy is through training. But how is this possible?

Information literacy is a set of skills designed to make the endless litany of information sources more manageable. This skill set includes the technical skills necessary to operate a computer, and, more importantly, the critical thinking skills necessary to evaluate and use the information (ACRL, 2000). The information literate person has a basic understanding of how information is organized, how to retrieve information and how to contribute to online communities through email and other communication resources. Most importantly, these are skills that are very easy to teach. Rudimentary skills in database searching and Internet searching, analyzing web sites for their veracity, and a basic competence in computer technology are indispensable skills for success in today's economy, and are an indispensible element in the bridging of the digital divide.

Without information literacy training, utilization of the digital commons is subject to the same conditions as the Tragedy of the Commons put forward by Floridi. Members of the community will continue to pollute the commons and information entropy will ensue. However, unlike traditional Tragedy of the Commons scenarios, the Tragedy of the Digital Commons doesn't require members of the community to restrain their behavior and it doesn't require a central authority to enforce cooperation, on the condition that users are trained in information literacy. Members can use the commons to pursue their own interests without concern for how their actions impact others.

This puts the onus on librarians to teach information literacy skills across all segments of the community. Information literacy is certainly a significant component in bridging the Digital Divide, but it is also important to help increase the skills of users who have some comfort in navigating the digital commons. Librarians should understand that they are not only helping patrons when they teach information literacy, but they are also insuring the health of the digital commons.

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