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The digital production gap: The digital divide and Web 2.0 collide

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Abstract :

How does class intersect with claims of digital democracy? Most digital inequality research focuses on digital consumption or participation, but this study uses a production lens to examine who is creating digital content for the public sphere. My results point to a class-based gap among producers of online content. A critical mechanism of this inequality is control of digital tools and an elite Internet-in-practice and information habitus to use the Internet. Using survey data of American adults, I apply a logit analysis of 10 production activities—from Web sites and blogs to discussion forums and social media sites. Even among people who are already online, a digital production gap challenges theories that the Internet creates an egalitarian public sphere. Instead, digital production inequality suggests that elite voices still dominate in the new digital commons.

1 Introduction

User-generated content tools, such as blogs, video-sharing, and other social media sites, have made it possible for ordinary people to create and distribute online content for the public to view, but who are these digital voices and whose voice is missing? As this mass cultural production of electronic content grows, new empirical and theoretical questions emerge about digital inequality from a production lens, building on the existing consumption and participation frameworks.

Drawing on national surveys of 41,602 people from 2000 to 2008, I find that a class-based digital production gap exists, even among people who are online. Consistent control of digital production tools and a context to use those tools mediate the difference between college and high school educated Americans, as to whether or not they create online content.¹ These explanations for digital inequality are more important for production than for consumption.

As the news media, academic research and public decision-making increasingly rely on Internet applications and content (Castells, 2000), an under-representation of the working class online creates an imbalance of views and perspectives. Without the voices of the poor, American citizens, particularly the political elite, can more easily ignore issues vital to these marginalized communities (Artz, 2003; Kendall, 2005).

Digital inequality scholarship has expanded from a divide based simply on computer ownership to a range of inequalities in access and use of various digital technologies (DiMaggio et al., 2004; Selwyn, 2004; Van Dijk, 2005). Internet research has also moved in the direction of understanding how skills, social networks and other resources mediate digital information usage (Hargittai, 2008; Mossberger et al., 2003; Van Deursen and Van Dijk, 2010). Much of this research has focused on the *consumption* of digital content. Some researchers have recently taken up the socioeconomic *participation* gap (Correa, 2010; Hargittai and Walejko, 2008; Jenkins et al., 2006), especially content sharing among youth or with social networking sites (i.e., Hargittai, 2007), or with electoral participation in politics and voting (Mossberger et al., 2008; Norris, 2001). However, scholars have not fully examined empirically the extent to which poor and working class adults engage in the *production* of online content for the *public's* consumption, not just for one's social network.

The theory that I explore is that the Internet promotes a democratic and diverse public sphere in which elite voices no longer dominate. Since traditional media outlets have ignored, mediated and stereotyped the poor and working class (Artz, 2003; Iyengar, 1990, 1991; Kendall, 2005) will the digital commons offer them a new voice? In place of the one-to-many model of content distribution by the mainstream media, some researchers (i.e., Benkler, 2006) argue that the Internet is inverting this model into a more democratic market place of ideas. Rather than people consuming information from just a few corporate media outlets, citizens can create their own content, as well as receive news and entertainment from millions of online outlets and citizen journalists. To refine this theory of online democracy and diversity, I test the hypothesis that a digital production gap exists by evaluating the effects of class on self-reports of ten production activities. These online uses, such as building Web sites, writing blogs or posting videos, result in content for the public's consumption.

In this paper, I bring to digital divide research an analysis of digital production inequality, expanding on the literatures that analyze gaps in access, consumption, and participation. These findings add digital content production to our understanding of how class affects cultural production, affirms the existence of a digital production gap, compares the mechanisms of this production inequality with consumption, and contributes a class perspective to the theoretical conversation of digital democracy discourse.

2 The state of knowledge

Scholarship on digital inequality has rarely employed an analysis of online productive practices based on class differences. I will provide a brief explanation and history of digital divide research, as well as what factors lead to engagement with digital technology. Then, I will show how digital democracy is an inadequate lens to understand digital production inequality. Finally, I will explain my framework for analyzing digital production.

¹ This study does not examine the volume or nature of the content.

2.1 *From the digital divide and consumption to digital inequality and production*

Digital divide theories often reflect the technological practices of the time period. Consumption, or basic online access, was the initial and prevalent inequality measure in stratification research. Only in the last decade have more productive applications emerged, often dubbed Web 2.0 or, more recently, social media. These innovations require empirical and theoretical analyses of the extent and mechanisms of digital cultural production.

When Bill Clinton and Al Gore began to use the term digital divide in 1996 they described a socioeconomic gap between people who had computer access and those who did not. Since then, researchers have disaggregated various aspects of online access and uses (DiMaggio et al., 2004; Selwyn, 2004; Van Dijk, 2005; Witte and Mannon, 2010). For instance, some people have high-speed access at home or work while others have to go to the library to go online or have an old computer with a slow modem. On the other hand, some Internet users browse, bank and blog online while others simply e-mail. Digital gadgets have also expanded from a basic desktop computer to laptops and smart phones for Internet access.² Research has also focused on explanations for online activity other than socioeconomic measures, such as age (i.e., Lenhart et al., 2008), race (i.e., Mack, 2001), and gender (i.e., Liff et al., 2004).

Some scholars continue to investigate socioeconomic differences, and research has become more nuanced in its study of digital inequality. Many scholars have examined adoption rates, including how and why the poor and working class, and other marginalized groups, are notable to receive information (Hargittai, 2003; Norris, 2001; O'Hara and Stevens, 2006). Others have expanded and further defined what Internet "use" means in relationship to social position. For example, Internet use among high-status individuals tends to be more for informational purposes (Notten et al., 2009; Peter and Valkenburg, 2006) or for "capital-enhancing activities" (Hargittai and Hinnant, 2008; Zillien and Hargittai, 2009), even when accounting for technology access and skills. However, some researchers have found that while high-status people have higher adoption rates than their low-status counterparts, they tend to stay online for less time (Goldfarb and Prince, 2008). In other words, scholars are examining what people do once they do go online or their "Internet-in-practice" (Zillien and Hargittai, 2009).

Researchers have also begun to examine to what degree socioeconomic status is associated with one's ability to create information online (Correa, 2010; Hargittai and Walejko, 2008; Robinson, 2009). Warschauer's (2003) concept of literacies is the groundwork for studying online production. He compares receptive online skills to reading and productive online skills to writing. Few studies, however, try to explain variation in productive activities. Jenkins (2006) coined the term "participatory culture" to describe a new cultural landscape, which inspires more youth to create online content (Lenhart and Madden, 2005). Scholars have also theorized how "prosumption" in the Internet era (i.e., Ritzer and Jurgenson, 2010) is not only the merging of production and consumption, but it also describes an interdependent relationship between them. However, little research has addressed the multivariate statistical relationship between class and online content production among American adults, specifically for the general public's consumption, not for just one's social network. Internet research, particularly digital inequality analysis, has focused on consumption, recently on participation and prosumption, but not fully on production.

Therefore, accessible online production tools for blogs and Web sites, as well as photo-sharing and video-sharing sites such as Flickr and YouTube, require another examination of social class. However, it is not simply new applications that justify further research. It is the theoretical underpinnings of these Web 2.0 activities. The digital democracy claim is that anyone can now produce content for the world to read, hear or watch.

Some analysts of the Internet phenomenon have eschewed a structural analysis because of the open architecture of the Web. Similarly, many sociology of culture theorists have moved away from or beyond material explanations for cultural production and toward more "endogenous" mechanisms (Kaufman, 2004). But, in reality, class remains critical, as it always has within cultural production. "How could culture, on its own, transcend the social, political and economic terrain on which it operates" (Hall, 1986:51)? Likewise, DiMaggio (1987) connected studies of cultural production (and consumption) with that of social structure in his influential "Classification of art." However, some Internet theorists argue that digital cultural production is outside the structure of political systems (i.e., Gitlin, 2003; Jenkins, 2006) or is an "emergence of a substantial nonmarket alternative" (Benkler, 2006:293). Nonetheless, digital inequality is tied to other forms of stratification (Hargittai, 2008). Hindman argues that the same societal structures outside of the digital world stay intact among bloggers (Hindman, 2009), and according to Terranova, "The relative abundance of cultural/technical/affective production on the Net, then, does not exist as a free-floating postindustrial utopia but in full, mutually constituting interaction with late capitalism ... " (Terranova, 2000:43). Despite these structures, though, even Gramsci maintained that people have individual will in cultural

² This study does not focus on the type of technology to produce content.

production, rather than a simple dichotomy of agency versus structure. In fact, Williams pointed out that structure matters in cultural production, not monolithically, but within "certain real pressures and limits" (Williams, 1977:204).

Hypothetically, anyone with an Internet connection can produce online content, but what types of limitations do the poor and working class have that might drive the digital production gap? The literature on the mechanisms of digital inequality sheds light on this question. Scholars generally point to a variety of both material and cultural factors (DiMaggio et al., 2004; Hargittai, 2008; Van Dijk, 2005).

First, owning or having access to the economic capital of hardware, software and other technological device is paramount to going online. Researchers describe this as the quality and autonomy of one's Internet activity (Hargittai, 2008; Hassani, 2006). These can include the frequency one goes online (i.e., Howard et al., 2001), the location of access, as well as one's technological tools (i.e., Horrigan, 2009). In a nod toward the production gap, recent research shows that consistent access leads to more creative activities, rather than doing what is minimally necessary when class constrains digital engagement (Robinson, 2009). Furthermore, the stratification literature often points to autonomy as a proxy for class (Hout, 1984; Wright et al., 1982).

Next, human capital, in terms of media literacy and skills, has a strong association with class in the likelihood of online use (Hargittai, 2002, 2008; Livingstone and Helsper, 2007; Mossberger et al., 2003; Van Deursen and Van Dijk, 2010; Warschauer, 2003). However, the length of time online shows mixed results with online engagement. Early research (Howard et al., 2001) points to an association, but Robinson (2009) demonstrated in her qualitative analysis that responses to questions about how long someone has been online are an inconsistent measure of use among the poor.

Finally, scholars have linked cultural resources with class-status. Neil Selwyn argued that it is simplistic to emphasize solely material questions of digital access and not contend with the " ... important social and cultural dynamics that structure participation and exclusion" (Selwyn, 2004:11). DiMaggio et al. (2004) synthesized how social networks and cultural capital are key mechanisms for Internet use. For instance, one study found that e-mail reinforces social networks and vice versa (Wellman et al., 2001).

Many of these studies on cultural factors build on a Bourdieusian analysis linking practices with class. Specifically, a few scholars have examined how habitus influences Internet practices (Kvasny, 2005; Robinson, 2009; Zillien and Hargittai, 2009). This critical mechanism for online activity is rooted in Bourdieu's (1984, 1990) description of how one's background affects one's habitus, or disposition, in this case, toward digital technology. Robinson (2009) coined the term information habitus, which aptly describes how people who do not have autonomous Internet access develop a "taste for the necessary" while people who are able to control their digital tools have a more playful and creative habitus. Furthermore, Zillien and Hargittai (2009) described how people from high-status backgrounds develop a much different Internet-in-practice than low-status individuals, even when accounting for similar technological gadgets and skills. In other words, economically marginalized users are less likely to engage in "capital-enhancing" online activities.

Nonetheless, because scant research has examined online content production for the general public, particularly by adults, rather than youth, it is important to return to class-based measures. Overall, digital inequality research is rich and varied in its analyses of material and cultural factors that influence Internet usage among economically disadvantaged populations. I hope to build on this scholarship of consumption and participation by focusing on public production of online content, which empirical scholars have not systematically studied.

2.2 *Does the Internet democratize and diversify the public sphere?*

With a production lens on digital inequality, new theoretical questions emerge about the Internet's potential as a platform for democratic discourse. Existing stratification and mobility theoretical frameworks of Internet use (DiMaggio and Bonikowski, 2008; Hargittai, 2008) also require an examination of media and democracy theories.

Many theorists claim that digital media offer a more democratic marketplace of ideas with more citizen journalists producing a broader range of viewpoints (Benkler, 2006; Jenkins, 2006) since reporters from mainstream media outlets tend to originate from elite backgrounds (Project for Excellence in Journalism, 2007). By not only creating content for the Internet but by also editing each others' creations, citizens have constructed a new, broader and more inclusive public sphere rather than the traditional corporate one-to-many system. The linear one-to-many model describes how the traditional and dominant corporate media broadcast news or entertainment to the public at large. On the other hand, digital technology has spawned a participatory distribution system in which information is freely exchanged in a three dimensional many-to-many model of information diffusion, like thousands of Habermasian town squares happening simultaneously. Some scholars (i.e., Benkler, 2006) tout the

revolutionary nature of these peer production mechanisms like blogs, wikis, and video streaming that redistribute power from a concentrated few into the hands of the many. Others argue that the critical feature of Web 2.0 technology is economic freedom (i.e., Zwick et al., 2008) and that cyber-libertarianism, agency, creativity, individualism and the hacker mentality of Internet pioneers propel and reinforce the power of online content creation (Ritzer and Jurgenson, 2010).

A few scholars disagree with this visionary claim and offer a more nuanced approach to how the Internet can be a tool for democracy (i.e., Meikle, 2002). For example, Hindman (2009) argues that the blogosphere is not more diverse than other media outlets, as many bloggers hail from graduate programs or mainstream media outlets.

Nonetheless, the power of the more utopian argument and new media's democratic potential motivate this study. "Diversification of communication channels is politically important because it expands the range of voices that can be heard... " (Jenkins, 2006:208). Jenkins concedes that not all voices have equal airtime, which he calls the "participation gap." However, he claims that "unquestioned authority" (Jenkins, 2006:208) and centralization have disappeared from the media, as digital technologies are more cultural and vernacular than analogue formats, which are more political and authoritarian. For instance, YouTube videos and fan-fiction blogs are just as important in the public sphere as are "high" cultural online formats, such as The New York Times Web site. Therefore, my analysis incorporates these everyday formats, such as newsgroups, through which ordinary people participate.

What is missing in all of the claims about digital democracy is how the poor and working class fit into the shift from a unilateral and authoritative one-to-many media system to a more diffuse and independent model of media distribution.

2.3 *The digital production framework*

If this study examines the production of online content for the public's consumption, what exactly is production and what is the public? In my framework, production of online content is a digital creation for anyone with an Internet connection to view (or hear), not just for one's social network.

Many scholars have debated Habermas' (1991) concept of a public sphere. According to Habermas, because of modernity and its associated economic and political changes, a bourgeois public sphere emerged in the 18th century in which rational debate could flourish. Fraser (1990), however, claimed that counterpublic spheres of marginalized groups, not just the male landed elite in Habermas' framework, also exist and challenge the status quo. Similarly, Warner (2002) challenged a unitary definition of public. He described a public and private sphere(s) that are neither, as the lines blur between the two. New media scholars describe how the Internet, itself, has vastly expanded and transformed into a new digital public sphere(s). For example, Varnelis' *Networked Publics* (2008) describes decentralized and interactive publics which are part of the new networked society (Castells, 2000). However, this scholarship has not examined how class plays a role in this digital public sphere.

Many theorists of culture have explored what it means to be a producer. Hall (1993) argued against a dichotomous line between a producer and consumer of cultural forms, while McLuhan and Nevitt (1972:4) posited that technology allows the consumer to "become the producer." According to some scholars, new media formats allow for an increasingly active, democratic, and participatory role of users in creating other new media formats (Neff and Stark, 2004; Von Hippel, 2005) although the claims are often around software, design, products, and organizational form, rather than information creation. Toffler (1980) introduced the term "prosumer" to describe the merging of production and consumption in economic terms. More recent scholars (Ritzer and Jurgenson, 2010; Tapscott, 1995) have theorized how the Internet, and Web 2.0, in particular, has accelerated the blurring between the producer and consumer. Another view (Miller and Slater, 2000) is that rather than production, it is consumption, such as situational use and space, that most dramatically influences the Internet. However, what is absent from all of these theories on the producer (and consumer) is how one's socioeconomic status matters.

Furthermore, distinguishing among communication, participation, production, and prosumption in this analysis is not precise. Some theorists (i.e., Ritzer and Jurgenson, 2010) argue that consumption and production are too disentangled to do so. To some extent, cultural production has always responded to some type of consumption (i.e., Haveman et al., 2010). However, to examine who is (and is not) producing online content for any Internet user's consumption, operationalizing online content production is essential. The critical difference that I am claiming is the audience for each activity. Communication describes one-to-one communication, such as e-mail or instant messaging, to an individual. Next, participation is a more one-to-some or many- to-many level of engagement, such as online communication among one's social network. Online participation is usually for more social purposes, often in response to others. Participation can range from basic interactions, such as social networking sites, to more complex activities, such as online polls. Next, the term prosumption (or co-production) can also refer to the peer-

production and participatory activities in which production is dependent upon consumption - the essence of social media. While prosumption can describe what may be happening at the intersection of production and consumption, distilling out the act of production, in and of itself, is vital. Therefore, production, in this typology, is content creation for the general public's consumption, such as Web sites, blogs and video postings. Still, the distinctions are not always clear-cut: an online rating is a sign of prosumption, but it also fits under the production framework; someone who posts a response to a blog could also be creating content for the broader public sphere. In fact, the business term Web 2.0 can encompass participation and production in its designation as peer production and interactive tools, and overlap exists. Nonetheless, a crucial distinction between participation and production is that the former describes more social and reactive mechanisms, rather than more independent activities that project content into the public domain. While production is not more valuable or important than communication or participation, it can require more persistence and resources. Also, production does not always rely on prompting or feedback from someone else. Online content production, such as posting to a daily blog or maintaining a Web site, is labor intensive and requires more leisure time since this commodity is often "free labor" in the digital economy (Humphreys and Grayson, 2008; Ritzer and Jurgenson, 2010; Terranova, 2000). In other words, it is not the distribution of online content that is so costly but the production (Hindman, 2009).

Therefore, I expect my research on the digital production gap to build on the consumption, participation and prosumption literature to interrogate whose voice is in this new digital public sphere. While this study has more modest goals than testing the overall digital democracy claims of the Internet, I expect this study to provide empirical answers as to whether these new Web 2.0 tools make possible an egalitarian system of content creators.

3 Data and results

I examine the relationship between class and ten online production activities to test the hypothesis of an online production gap; analyze the mechanisms of the inequality; as well as evaluate theories of digital diversity and diffusion. I studied 17 Pew Internet & American Life Project national surveys from 2000 to 2008. Using cross-sectional logistic regression of categorical data, I investigated the estimated effect of a person's education on whether or not someone produced digital content for the general public. The findings show class differences in these activities over the nine-year period. Location and frequency of connectivity are intermediary variables between class and production. By focusing on one particular survey, results also show that having digital tools, along with the social and work-related reasons to be online, or a distinct Internet-in-practice and high-status information habitus, are critical to the class-based production divide.

3.1 Methodological validity

The Pew Internet Life Project has the most useful datasets available for this study. It is the only publicly available data set that tracks Internet usage over time and has extensive questions about a wide variety of *types* of Internet productive activities, rather than only basic use. The data also go beyond much of the literature whose samples draw from high school or college students.

The sample from each survey is representative of the U.S. population of English-speaking adults. While the Pew surveys, like other telephone surveys, have response rates approaching 30%, Keeter et al. demonstrate that response rates at this level are comparable to surveys with response rates twice that high (2000). In addition, the populations that Pew undercounts are sub-samples from lower socioeconomic levels, as well as Hispanics, who also tend to be from lower education levels, so if the samples are biased against less-educated adults, they are also biased against my hypothesis of inequality. Results would minimize class differences when surveys miss non-users of technology and those from lower socioeconomic backgrounds. I would predict that these biases undercount low-income non-users and underestimate the digital production gap. Furthermore, Pew has more comprehensive coverage of the population than most other telephone surveys because they generally employ cell phone numbers, as well as land lines. Pew also constructed sample weights for demographic biases using the most recent Census Bureau Annual Social and Economic Supplement, which I incorporated into my analysis.

Pew maintained a consistent design for sampling and interviewing across 37 surveys, allowing me to infer that differences among them result from changing patterns of Internet use and are not artifacts of data collection (Online Appendix II, Table A). Sample size averaged 2447, with the lowest at 914 respondents and the highest at 4001. Of the available surveys since March, 2000, I chose 17 surveys that included consistent questions about respondents' production for the Internet (Table 1).

Table 1

Percentage of American adults engaging in online productive activities.

	Individual productive activities					Create content	Share creation	Semi-public forums		
	Blog	Web site	Photos	Video	Rating			Chat room	News-group	Social network
2000 March								13%		
2001 October								11%		
2002 June	2%					8%		15%		
2002 September	4%					11%				
2002 October						11%				
2003 March	2%	8%	13%	2%					6%	
2004 February	3%									
2004 June					16%					
2004 November	4%									
2005 January	6%									
2005 February	6%							11%		5%
2005 September	6%				22%			16%		9%
2005 December	5%	9%					17%			
2006 February	6%	9%	9%	1%			14%		13%	
2006 December	6%	10%		6%	22%		16%			14%
2007 February	9%			6%						
2008 May	9%									21%

Source: 17 Pew Internet & American Life Project Surveys.

^a Based on weighted samples. The percentages are precise to within a margin of error of $\pm 2\%$.

^b Blank space indicates that the question was not asked in that year or survey not suitable for analysis.

^c Photo production went down in this analysis but was most likely due to the evolving nature of the photo production question than fewer people posting photos.

3.2 Statistical model and design

A cross-sectional analysis of these data with a logit model is the most appropriate statistical method since the dependent variables of interest - online productive usage - are dichotomous and categorical, rather than continuous. While the available data are not longitudinal, tracking productive online activities over a nine-year period enables a replication that allows for robust patterns rather than an idiosyncratic spike during one survey time period. However, for one survey, I also construct a scale of the number of activities in which one engages, as well as predict the probability of whether or not someone uses any of the productive tools. I test whether a digital production gap exists between college and high school graduates, as well as evaluate other contributing factors to the gap.

3.3 Online production activities-dependent variables

The conceptual, central dependent variable is production of online content. The primary research question is the extent to which class affects whether or not people produce online information available to the broader public, rather than a metric of how much they produce or the types of content creation. Thus, a key criterion in choosing an online activity is whether it results in content that can be viewed by any Internet user (unlike, say, e-mail which is directed to one or a specific group of people). To choose productive activities from the hundreds of uses in the Pew surveys, I incorporated Warschauer's (2003) classification of literacy skills for production, as well as Hargittai's (2007) dimensions of various online uses and required abilities. However, neither of these frameworks is sufficient to distinguish between productive and consumptive uses, as well as between a public or private audience for each use. Categorizing each online activity, therefore, required prudence in determining its function but also how it might affect my hypothesis. For example, I chose a few uses, such as discussion forums, that are not easily available for the broader public, because I wanted to include activities that fit into Jenkins' broader cultural participatory framework, not simply the obvious public outlets, such as blogs. Overall, ten productive uses emerged that encapsulate an ordinary citizen's ability to produce content.

Online production fits into three categories in this conceptualization (Table 1). The first type of productive uses is an individual activity for the public sphere (blogs, Web sites, photo/video posts and ratings). Next are two

concepts that are composites of the individual activities. One of these aggregated uses is sharing one's creative work online. The other reflects content creation in which Pew surveyors asked specifically about whether or not someone has created a variety of content, such as Web sites, blogs, etc. The final category crosses the line between a public and private audience (social network profiles and discussion forums). Discussion forums (chat rooms and newsgroups) refer to threaded conversations on Web boards, but they are distinct questions, partially reflecting the evolution of Internet applications. This category also represents uses that might be less independent and more reactive than the individual and composite online productive activities. Certainly, this typography is not rigid. For instance, sometimes an online rating is a self-initiated and composed review. Other times, it is a direct response to a company's prodding and simply a numerical score, which is presumably why such a high proportion of Americans have participated in online ratings.

All ten productive uses each have the possibility to be political, social or cultural commentary for the public's consumption. Some activities, such as blogging, have an obvious capacity for public discourse. While discussion forums may not seem as quickly and publicly available as blogs, more than twice as many American adults produce content for discussion forums than blogs (Table 1). In this respect, then, discussion forums are powerful public discourse tools.

Each usage corresponds to a separate question that Pew asked in the year indicated (Table 1). Some years' surveys did not always ask questions about uses that were in previous surveys, even if Americans still engaged in the activity (Online Appendix II, Table A). In addition, the wording of questions for the same activity evolved. Still, most of the changes reflect current usage or were small changes as not to affect meaning (i.e., "contribute" vs. "create"). Other changes reflect additions to activities. For example, the social networking question adds Facebook as an example for respondents in 2006. Nonetheless, I am not analyzing the change in the overall number of people engaging in an activity but gaps in usage.

Production activities, themselves, have evolved. For instance, while the overall percentage of Americans in the sample who participated in chat rooms increased from 2000 to 2005, the percentage of those among all online consumers actually declined. Relatively fewer Internet users used chat rooms, but more presumably engaged in other activities, possibly newsgroups. This study does not examine recent applications that have a role in the public sphere, such as Twitter, the micro-blogging site. Herein lies a challenge of any study of emergent technologies: that the object under study is a moving target. However, in choosing ten separate uses or types of uses, I built in a kind of replication that directs attention toward more robust general patterns and away from the idiosyncrasies of one particular indicator.

Overall, productive uses are increasing (Table 1), as more ways to create content emerge from year to year, and generally more people are engaging in each activity. For most of the ten uses, a small group of people are creating online content, never more than about one-fifth of the population but usually lower than ten percent. While the Internet allows for more contributors to the public sphere than with previous media producers, the question remains as to the egalitarian nature of the new digital commons.

3.4 *Main factors explaining online production*

To operationalize the extent to which the poor and working class create digital content, I focus on educational level. However, other variables that explain the class differences in this cross-sectional model are income, as well as location and frequency of Internet use.

The primary variables available in the Pew data that traditionally approximate class are education and income.³ Creative usage requires skills that people with more education would have, like complex writing, grammar, and comprehension. The importance of income is the ability to buy and access Web 2.0 tools, such as computers and Internet access, along with other hardware and software. Education and income are, of course, correlated. Among all adults, income is statistically significant⁴ in the logit model for seven of the ten activities (Online Appendix II, Table C). However, among those online (Table 2), the effect of education generally reduced the effect of income to non-significance (sharing content and newsgroup postings excepted).

³ Variable construction details available in Online Appendix I.

⁴ For all of the reported results that show a relationship between a variable and a productive activity, the finding is significant at the $p < 0.05$ level.

Table 2

Logit analysis of digital production activities among Internet users.

	Blog	Web site	Photos	Videos	Rating	Create content	Share creation	Chat room	News group	Social network
Education										
Less than H.S.	-0.11	-0.17*	-0.68*	-1.01*	-0.82*	-0.94*	-1.02*	0.50*	-1.04*	-0.36
H.S. Grad	-0.21*	-0.63*	-0.62*	-0.16	-0.76*	-0.64*	-0.52*	0.19*	-0.85*	-0.63*
Some college	0.03	-0.31*	-0.26*	0.05	-0.25*	-0.41*	-0.22*	0.19*	-0.27*	-0.25*
College plus										
Race										
Black	0.26*	0.40*	-0.53*	-0.45	-0.02	-0.21	-0.22	0.25*	-0.27	-0.09
Asian	0.32	0.24	0.05	-0.33	0.00	0.20	-0.15	0.14	-0.09	0.48
Other	0.23	0.10	-0.17	-0.69	0.30	0.25	-0.08	0.14	-0.14	-0.03
White										
Hispanic	0.07	0.29*	0.12	0.57*	-0.26	-0.37	0.18	0.16	0.13	0.19
Non-Hispanic										
Women	-0.18*	-0.38*	-0.04	-0.66*	-0.13	-0.44*	-0.13	-0.29*	-0.61*	-0.10
Men										
Age	-0.10*	-0.06*	-0.06*	-0.13*	-0.01	-0.02	-0.04*	-0.07*	-0.02	-0.10*
Age squared	0.00*	0.00*	0.00	0.00*	0.00	0.00	0.00	0.00	0.00	0.00
Main activity										
Employed student	0.31*	0.52*	0.17	-0.29	-0.18	0.46*	0.47*	0.26	0.65*	0.24
Student	0.36*	0.24	0.43*	-0.11	-0.06	0.52*	0.57*	-0.12	0.61*	0.42*
Unemployed	-0.08	0.06	-0.25	-0.11	0.14	0.05	0.02	0.17	0.31	0.12
Retired	-0.25	-0.28	-0.05	-0.66*	0.02	0.27	-0.04	0.08	-0.06	-0.30
FT employed										
Income	0.00	0.00	0.00	0.00	0.00	0.00	0.00*	0.00	0.00*	0.00
Inc Dummy Top	-0.00	0.33*	0.14	0.23	-0.02	0.28	-0.07	-0.06	-0.14	0.09
Inc Dummy NR	-0.19	0.09	0.18	-0.14	-0.20	-0.47*	-0.08	-0.27*	0.17	-0.25
Community type										
Suburban	-0.13	-0.04	0.05	-0.22	-0.17*	0.02	-0.01	0.09	-0.12	-0.03
Rural	-0.28*	-0.12	0.01	-0.60*	-0.35*	-0.07	-0.22	0.24*	-0.23	-0.17
Urban										
Marital status										
Married	-0.24*	-0.16	0.14	0.11	0.12	0.18	-0.20	-0.41*	-0.35*	-0.43*
Living together	-0.14	0.18	-0.16	0.24	0.34	0.56	-0.05	0.09	0.19	0.37
Divorced	0.07	-0.05	0.29	0.11	0.07	0.39	-0.14	0.20	-0.04	0.11
Separated	0.08	0.11	0.49	0.39	0.19	0.07	0.36	0.12	0.88*	0.42
Widowed	-0.23	-0.79*	-0.20	-1.64*	0.06	0.96*	-0.36	0.34	-0.23	-0.36
Single										
Parent	-0.21*	-0.06	-0.22	-0.01	-0.18*	-0.17	-0.15	-0.09	0.01	-0.26*
Non-parent										
Time	0.02*	0.00	-0.02*	0.03*	0.01*	0.11*	0.00	-0.00*	0.02*	0.05*
Constant	-10.30*	-1.38	8.74*	-17.10*	-6.27*	-56.18*	-1.15	2.55*	-13.70*	-23.34*
<i>N</i>	19873	7577	4211	7158	5002	3762	6062	8098	4211	6469
<i>F</i>	26.4	10.7	7.17	5.58	7.52	7.73	9.65	26.8	8.08	21.7

Source: 17 Pew Internet & American Life Project Surveys 2000-2008, Logit Mode! 1.

Note: Income is reconstructed from \$10,000 and \$25,000 increments into a continuous variable based on the Consumer Price Index to enable cross-year comparisons in light of inflation.

* $p < 0.05$.

Simply, education remains robust. Presumably, income matters less for people who are already online (in terms of production) because having Internet access is a proxy for income. Moreover, class terms are slippery and debatable, even within the field of stratification, yet educational attainment (Hauser and Warren, 1997) is one of the best single measures of class available. As a result, education is my primary explanatory variable for online production.

I reconstructed both of these conventional class variables for my analysis. First, I turned the income measurement into a continuous variable based on the Consumer Price Index to enable cross-year comparisons in light of inflation. Next, I recoded the responses to one's educational level into four categories - whether or not someone dropped out of high school, graduated from high school, attended some post-secondary institution or graduated from college. This operationalization has a theoretical basis from the stratification literature on educational transition and literacy stages (i.e., Mare, 1980). However, people without a high school degree would most likely lack the basic literacy skills to engage in online production. While I examine all four educational levels in my analysis, I focus my findings on the comparison between high school and college graduates to set a higher and more practical standard for my hypothesis. I also interact time with education in results not shown, to confirm

that the gaps were consistent across time.

A key mechanism to predict whether or not someone produces online content is the location of access. If people are able to use the Internet both at home and at work, they have more control over their productive and creative environment, as my data show and as Robinson's (2009) qualitative data demonstrate. Where a respondent uses the Internet may be a proxy for autonomy, which is associated with class (Hout, 1984; Wright et al., 1982). The location variable consists of whether or not someone goes online at home, at work, at both places, or at neither location. Most surveys did not ask what that "other" location was, but in those that include an open-ended response, the top three locations are a friend's house, a library or a neighbor's house.

Another key variable affecting the likelihood of someone creating online content is the regularity of production. Since Pew phrased the survey questions to include someone who has ever engaged in an activity, the bar is quite low for production. Therefore, this bias (toward less regular producers) would challenge rather than support my hypothesis since I am including even occasional producers. However, two questions throughout all the surveys highlight this question of frequency: how often someone goes online in general, ranging from several times per day to less than every few weeks, and whether someone went online the day before the survey ("yesterday"). For five of the activities, the data consistently distinguish, for example, between someone who blogs daily versus someone who has ever blogged, so I examine these five uses in an additional analysis.

Finally, my question about digital inequality draws on two samples. First, I examine the likelihood of online production among all American adults ($n = 41,602$). Second, what do American adults do once they go online? What is the likelihood that they create content for public consumption, and what are the mechanisms of any inequality? To answer these latter questions, these logit models only include Internet users ($n = 24,806$).

3.5 *Building the statistical models*

To analyze the role of class in whether or not an American adult engages in productive activities, I used a basic logit model for each of the ten activities across all 17 surveys. Then, with only Internet users, I constructed six statistical models to further refine the mechanism of inequality.

Key demographic variables compose the basic model among all adults. Results (Table 2) show that class, via education and income, is the most powerful predictor of online production.

Even among Internet users, more education-based variables are statistically significant ($p < 0.05$), and therefore have more of an estimated effect on production, than any other types of variables, such as race, ethnicity, gender, geographic location or even age or student-status.

What contributes to the educational gap? Determining the mechanism(s) among Internet users is the task of building onto the demographic variables in Model 1. When the model expands to include autonomy and control of one's digital engagement, these structural measures make class even more robust in how it is associated with production.

The second model, therefore, includes the location where Internet users access their computers. Having connectivity at both home and work is critical to whether or not someone is a consistent user, all of which support one's technology use. Under this model, nine of ten uses (posting videos excepted) show that people who have consistent Internet access at home and at work are more likely to produce content, as opposed to just at home, only at work, or at neither place (Table 3). This location factor intervenes between education and production. For example, it takes the significance away from education among bloggers (Online Appendix II, Table F). Another critical factor in controlling the means of content production is online frequency.

Both of these intervening variables, whether or not someone went online "yesterday" and frequency of use, reduce the effects of education level, which also signals as a mechanism. Consistent and frequent online access does lead to higher productive usage on all activities, so these factors also stay in the model (Table 3).

For all ten activities, the longer people use the Internet, the more likely they are to produce online content (Table 3). Experience could allow users time to learn the skills necessary to create online content. Adding this factor to the mix reduces the power of education only slightly in predicting online content. Although this variable has mixed results in the literature, because of its statistical significance and possible relation to class, it remains part of the model.

Table 3

Predicted probabilities of productive activities from American adults online.

	Blog	Web-site	Photo	Video	Rating	Create content	Share creation	Chat	News-group	Social network
Education										
H.S. grad	0.06	0.09 ^a	0.11	0.04	0.21 ^a	0.13 ^a	0.17 ^a	0.25	0.09 ^a	0.1a1
College grad	0.06	0.14	0.17	0.04	0.36	0.19	0.24	0.16	0.18	0.14
Not online yesterday	0.04 ^a	0.08 ^a	0.06 ^a	0.02 ^a	0.20 ^a	0.11	0.12 ^a	0.17 ^a	0.07	0.09 ^a
Online yesterday	0.08	0.15	0.19	0.05	0.35	0.22	0.26	0.23	0.18	0.16
Frequency										
Less often	0.02 ^a	0.04 ^a	0.06	0.02	0.14 ^a	0.02 ^a	0.06 ^a	0.13 ^a	0.02 ^a	0.04 ^a
Every few weeks	0.03 ^a	0.05 ^a	0.06	0.06	0.12 ^a	0.05 ^a	0.06 ^a	0.15 ^a	0.05 ^a	0.05 ^a
1-2 days/week	0.03 ^a	0.06 ^a	0.04 ^a	0.01a	0.19a	0.08a	0.12a	0.14a	0.04 ^a	0.09
3-5 days/week	0.05 ^a	0.08 ^a	0.07 ^a	0.02 ^a	0.24a	0.1üa	0.15a	0.19a	0.08 ^a	0.09a
Once/day	0.05 ^a	0.09 ^a	0.13 ^a	0.03 ^a	0.28 ^a	0.14 ^a	0.19 ^a	0.20 ^a	0.12 ^a	0.11 ^a
Several times/day	0.10	0.17	0.21	0.06	0.37	0.27	0.29	0.24	0.21	0.18
Access location										
Neither	0.06 ^a	0.07 ^a	0.03 ^a	0.03	0.16	0.08a	0.14	0.31	0.04 ^a	0.09 ^a
Work only	0.04	0.04	0.08 ^a	0.04	0.19a	0.07 ^a	0.11a	0.12 ^a	0.06 ^a	0.13
Home only	0.06	0.09	0.11	0.03	0.27	0.13	0.19	0.22	0.10	0.11
Home and work	0.08	0.15	0.18	0.05	0.34	0.23	0.24	0.21	0.19	0.16

Source: 17 Pew Internet & American Life Project Surveys: 2000-2008, Logit Model 6.

^a Statistically significant ($p < 0.05$ level) difference from the likelihood of the grayscale-row activity in that category.

To test how one factor might modify another, I include interaction terms that are significant for one usage and have theoretical relevance. I also looked for patterns across uses, across interactions and across time since F -tests are not possible (Online Appendix 1).

The final model among all Internet users, then, to estimate predicted probabilities and to examine the mechanisms of the online digital production gap incorporates one's online location(s), user intensity, frequency of use, how long someone has been online, and interactions (Online Appendix II, Table E).

3.6 Main findings and discussion of digital production inequality

On top of the digital consumption gap is another layer of inequality. Confirming the hypothesis that a digital production gap exists, people with a high school education are less likely to produce online content than those with a college or graduate degree. Even among Internet users, class-based inequality persists. Key mechanisms of this gap are the location of where one accesses the Internet and frequency, which are both measures of the level of autonomy one has with the Internet. Class matters, not just youth.

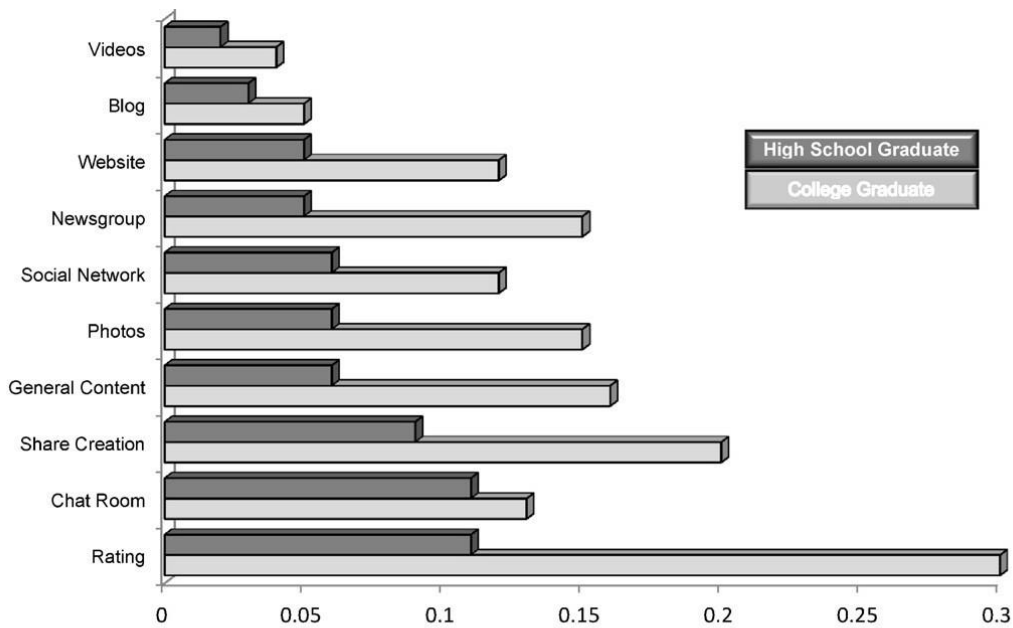
A few anomalies in the inequality point to how the more independent and public production activities, such as building Web sites, have more class inequality than those from other categories, based on the typology in Table 1. On the other hand, participating in chat room discussions has some level of inequality based on autonomy but not on education level. Social network postings show minimal, although statistically significant, educational inequality. However, these activities are more reactive than the other categories of online production uses (ratings possibly excepted), and discussion forums are arguably the least public of the ten activities.

Because one cannot directly interpret the output or the interactions from a logit analysis, I calculated predicted probabilities of engaging in each activity based on the two models consisting of (a) all American adults and (b) Internet users. All gaps in probabilities are consistent overtime.

First, among the general American adult population, all ten activities show a statistically significant⁵ educational gap between college and high school graduates in the likelihood of producing content (see Fig. 1). For example, bloggers are more than 1.5 times likely to have a college than a high school degree. College educated users are twice as likely to post photos and videos, as opposed to high school users. The probability that a college graduate would write an online rating or a comment to a newsgroup is three times greater than that of a high school graduate.

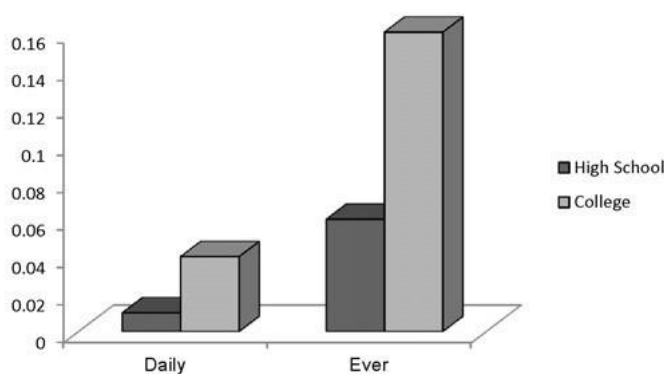
⁵ Again, with all of the reported results that show a gap between a variable and productive activity, the finding is statistically significant at the $p < 0.05$ level.

Income, race, ethnicity and gender are also associated with online production among the general population although none are as robust and unequivocal as education (Online Appendix II, Table C). Seven of the activities show a slight income gap: people with a higher income are more likely to create content. Racial and ethnic differences, however, are more split. High school educated African Americans are generally as likely to be producers as their white counterparts, but a racial gap emerges with a few activities among the college educated. For example, white college educated Americans are 1.5 times as likely to post photos than black college graduates. However, college educated Web site creators are more likely to be Black than white. Similarly, Hispanics are less likely to post ratings but more likely to post videos. Finally, findings show that women with a high school education generally have the same likelihood to produce online content than similarly educated men.



^a Differences, between high school & college educated, in the likelihood of production, are statistically significant at the $p < .05$ level.
^b Source: Logit analysis from 17 Pew Internet & American Life Project Surveys, 2000-2008 (Online Appendix II, Table C).

Fig. 1. Predicted probability of online production among American adults.



^a Differences, between high school & college educated, in the likelihood of production, are statistically significant at the $p < .05$ level.
^b Source: Logit analysis of Pew Internet & American Life Project Surveys, 2002 (Online Appendix II, Table C).
^c Survey question is composite variable of creating content such as blogs, Web sites, etc.

Fig. 2. Predicted probability of producing online content among American adults.

To further interrogate digital production inequality among all American adults, I isolated daily producers from less regular creators. With five of the uses, Pew asked whether or not someone engaged in that activity the day before. Among this group of elite users, educational gaps widen considerably. For instance, people who create content are four times as likely to have done it yesterday if they have a college, rather than a high school, degree, as compared to a twofold gap among people who have ever posted content (Fig. 2).

What happens, though, to digital production inequality when people have the resources to be online? Certainly, class-based digital production gaps are wider when examining the entire American adult population than when isolating Internet users. However, going online does not simply lead to participating in the new digital public sphere. Inequality persists over time. Furthermore, analyzing only Internet users affords an analysis of the mechanisms of production.

While income is a key explanation for production among all adults, once online, income is a proxy for access. Therefore its effects weaken, so it does not matter as much as education does for production. Indeed, education is the most robust class-based measure of production for both the general population and for Internet users. In the demographic model (1), having a college education is much more predictive of producing content, compared to someone with only a high school degree in all but two activities - online videos and chat rooms (Table 2). However, if the model excludes those under 25 years old, then all ten uses show an educational gap among those online, just as with all American adults.

Even in the final model with more class-based variables displacing education, six of the ten activities show a statistically significant educational gap between college and high school graduates in the likelihood of producing content (Table 3). The likelihood of creating newsgroup content is almost two times greater for college graduates, compared to high school graduates. Someone is about 1.5 times as likely to produce content in the composite category, as well as build a Web site or post a social network profile, if he or she has a college degree, rather than a high school education.

What of the other four uses that do not show educational inequality among those online? While descriptive statistics do show a higher percentage of college graduates, over high school graduates, who blog, post videos, and create general content, none of these differences is statistically significant under the final logit model. One possible explanation is that the overall percentage of adult Americans engaging in three of these activities is low (generally less than 5%), so percentage point differences are quite small. The one anomaly is posting to chat rooms, which shows a higher likelihood of high school graduates engaging in chat room discussions, yet chat rooms are arguably the least public of activities. Nonetheless, it is the class-based barriers of location and frequency that most likely explain and intervene in the four uses which do not show a substantial education gap among people who are already online. Simply, these mechanisms displace education as explanatory variables.

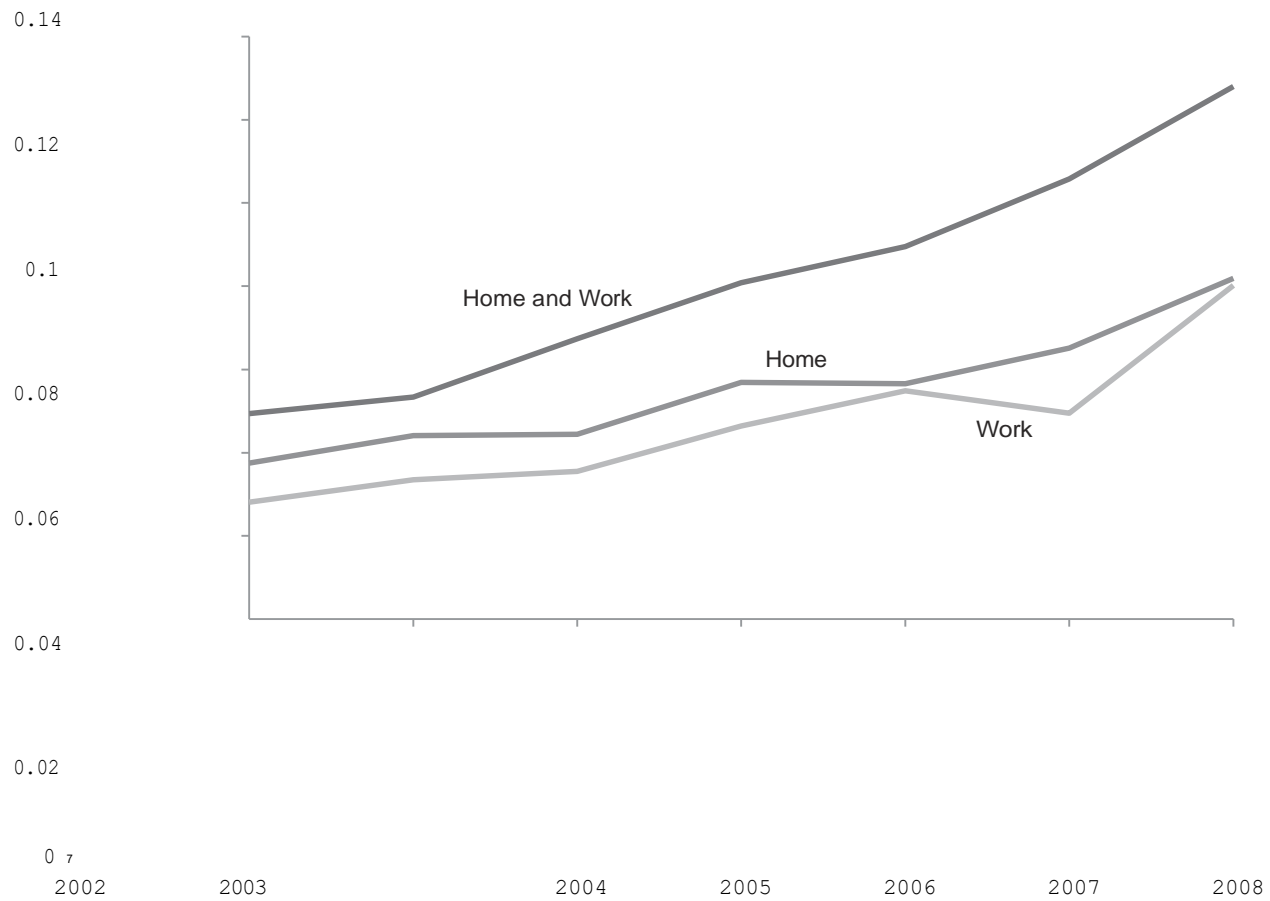
The location of connectivity, and therefore a mechanism of control of the means of production, does matter for three of these remaining four activities (Table 3). The likelihood of participating in chat rooms, blogging, and posting photos is associated with the location of Internet use. For example, someone is three times more likely to create general content for the Web with connectivity at home and work, rather than just at work or at neither location. For nine of the ten productive activities, then, having this control over the means of producing online content increases the likelihood of online production. Connectivity at both home and work is most predictive of production, but home-based access is next most predictive while work-based access is generally the least likely to lead toward production among the three locations (Fig. 3). An Internet user with a college education has more payoff for having access at both locations, particularly for newsgroup and Web site production.

Furthermore, the higher one's education, the more likely that work access is associated with higher predicted probabilities of production. In fact, in a 2006 Pew call back study of bloggers, 78% of respondents over the age of 22 have professional jobs or own their own business. It is possible that the higher one's educational level, and class, the more likely that he or she will have the freedom to utilize a work computer for more flexible reasons than someone with a lower education, who may be more restricted as to what he or she can do with a computer at work. In other words, it is more than simply having access - it is how much one can control the productive tool that is the computer. It is not, then, simply whether or not one uses a pencil (Dinardo and Pischke, 1997), or in this case a computer, at work but what one can do with the tool. Likewise, except for student-status, one's employment status generally did not have a relationship with production.

In addition, whether or not someone is a regular user at these locations is another way that autonomous connectivity predicts content creation. For most activities, people are twice as likely to have ever produced online content if they went online the day before (Table 3). Similarly, the frequency of connectivity is related to production. American adults are two to thirteen times as likely to have ever produced online content if they access

the Internet several times per day, as compared to less than every few weeks. Even people who go online once per day are two times less likely to blog than Internet consumers who are online several times per day.

The finding of a linear relationship with frequency and production is not surprising: the more someone is online, the more opportunity for production. However, it is not simply this easy comparison of people with frequent versus rare access. What is remarkable is when this linearity ends for the most public of online production activities. Generally, a spike upwards in the likelihood occurs from going online once per day to frequently throughout the day (Online Appendix, Figure A). Even people who go online once per day are two times less likely to blog than Internet consumers who are online several times per day. Going online daily is not enough. Overall, the variables that drive production, such as frequency and access location, are also connected with each other in that controlling the means of production is critical, and people with higher educational levels are more likely to be able to have this autonomy throughout the day. These findings mirror Robinson's study of economically marginalized youth just doing what is necessary when they are able to go online, rather than having the luxury of more creative activities with consistent access (Robinson, 2009). In other words, location and frequency of access are intermediary variables between class and production.



a. Each line is statistically significant at the $p < .05$ level (without frequency variable, as they are highly correlated) and shows the likelihood of blogging, based on one's Internet location. To set a higher standard, having "neither" access is not included.

b. Source: Logit analysis from Pew Internet & American Life Project Surveys 2002-2008.

Fig. 3. Predicted probability of blogging based on location of connectivity.

3.7 Interrogating online production - digital and cultural tools

To verify these findings of a digital production gap among Internet users and to further interrogate the mechanisms of the inequality, I analyzed one survey (February 2006) that had six production activities. Results show that ownership of digital production tools, as well as a more privileged Internet-in-practice and information habitus to use new technology, is associated with more online content creation. I constructed a scale of how many activities someone uses: newsgroups, blogs, posting photos or videos and sharing one's artistic creation online. In another model, I also determined the probability of someone engaging in at least one of the activities. By focusing on this one study ($n = 4001$), I was also able to probe three more factors contributing to production since the constraint of consistency across 17 surveys was no longer in place. This approach also addresses the limitations of those creative activities, such as video postings, which have a low percentage of producers. Finally, this focused analysis attends to the challenges of a cross-sectional analysis with evolving Internet question framing.

First, more education is associated with more productive activities. Based on a regression analysis, someone with a high school education is less likely to engage in as many activities as a college graduate (Online Appendix, Table Q). In addition, multiple location points of Internet access and frequency of usage all point to a greater number of online productive uses. With this 2006 survey, I also conducted a logit analysis, which examines whether or not someone has engaged in any of the six production activities (Table 4).

First, Model A has the same variables from the previous analysis of all of the surveys, and it also shows a consistent educational gap in the likelihood of producing any online content. Like the data from the cross-sectional analysis, this model demonstrates that having a computer at both home and work leads to a higher probability of producing online content, as does the regularity of going online.

Model B adds whether or not someone has high speed Internet access at home, such as broadband from cable or DSL. This material asset also leads to more production and contributes to explaining one's likelihood of producing online content, but only among people who have Internet access at home.⁶ Modem speed adds more context to the quality of a home connection. Having high speed Internet access facilitates production, rather than a slow dial-up modem, which would make posting photos, for example, very slow and difficult. Adding this broadband factor does not substantially reduce the effect of any other explanatory variables.

Another way to examine the intermediary variables of the quality and autonomy of Internet access is in Model C. This analysis adds another material factor, having more technological gadgets (such as smart phones or laptops). This is a scaled question on the survey, based on the number of devices the respondent has. This gadget factor reduces the size of the effect of Internet location and high speed access on production, as it is another way to explain this type of high-quality access. In other words, a class-based resource factor becomes a primary intermediary variable, but even within this model (C), education level and regularity of use are still critical in explaining online production. In the regression analysis, an increase of one gadget is associated with a rise in content creation by 18% (Online Appendix II, Table Q).

Table 4
2006 logit models of engaging in any online production or consumption of content.

	Model A	Model B	Model C	Model D	Consumption
H.S. Grad	-0.32*	-0.26	-0.25	-0.23	-0.42*
College plus					
High speed Internet	0.01	0.02	-0.02		0.33*
Have gadgets		0.28*	0.25*		0.10*
Elite Internet-in-practice			0.25*		0.06

Source: Pew Internet & American Life Project Survey, February to April 2006, $n = 4001$, among Internet users.

^aSix activities include: newsgroups, blogs, Web site creation, posting photos and videos and sharing one's art online. ^bFull version of table available in Online Appendix 11, Table R.

* $p < 0.05$.

⁶ Therefore, the sample size is slightly lower since everyone does not have home access. I constructed this dichotomous variable, based on modem type.

The final model, D, incorporates more of a cultural component of class to the more material mechanisms. This composite variable is a scale of positive responses to questions of how digital communication gadgets improve one's ability to connect with one's social network, to facilitate community involvement, to accomplish work, and to foster a creative learning and sharing environment. Borrowing from Robinson (2009) and Zillien and Hargittai (2009), I am referring to these questions overall as both a high status information habitus and Internet-in-practice to use new technology. In other words, these cultural factors are both a disposition toward and praxis of technological tools integrated into one's daily life. These variables are less tangible measures of production factors but do explain how iterative reasons to go online in daily practice can cultivate production. However, one's class background is correlated with these connections, rather than being independent from socioeconomic status. In the regression analysis, an increase of one of these cultural factors is associated with a 15% increase in the likelihood of producing more online content.

Therefore, in order to produce online content, one must use the Internet frequently and have a higher education, digital tools, consistent connectivity, and a distinct Internet-in-practice and information habitus. A path analysis (Online Appendix II, Figure B) with coefficients highlighting both cultural and material factors is possible with the regression model from the 2006 survey. Results demonstrate how both the cultural and material aspects of class contribute to digital inequality. The correlation between these two variables is $r = 0.33$, which points toward the impossibility of clearly distilling the cultural and material aspects of class. They are entwined.

3.8 *Consumption versus production inequality: results and mechanisms*

How do these mechanisms of online production differ from consumption? Producers face the same socioeconomic constraints that consumers do, such as education and digital tools. However, a few class-based demographic differences emerge (Online Appendix II, Table R).

One's student status is substantial for consumption and generally for the cross-sectional data results. However, with the 2006 study's additional class-based variables of digital tools and an elite Internet-in-practice added in the model, being a student diminishes in importance in explaining production. Perhaps these questions of one's distinct information habitus fostering online engagement are a proxy themselves for student status, which allows me to move beyond the presumption that once students, or digital natives, start to age, the digital divide will completely disappear.

Racial and ethnic gaps are also much wider between Internet users and those who are not than between producers and non-producers among the general population. However, these gaps narrow considerably, and sometimes reverse themselves with production. For instance, overall, Blacks are more likely than whites to post to chat rooms, social network profiles, as well as blog and create Web sites. However, African Americans and Hispanics are less likely to be online at all.

Furthermore, educational and income gaps are larger for consumption than that of production. However, the reverse is true for the digital device and cultural practice questions in the 2006 study (Table 4). In other words, additional gadgets affect the likelihood of producing online content more than they do for consuming content. This may be due to the number or quality of computers or cameras, for example, necessary to post. In addition, the more someone's work, family or social life improves with these electronic devices, the more likely one is to produce content than simply to go online. Controlling the means of production and having a form of elite Internet-in-practice and information habitus, then, fosters production more than consumption.

3.9 *Limitations*

Some weaknesses exist in this study. First, the data do not distinguish among various types of digital content production - whether people are blogging about their pets or politics. The responses also cannot indicate what type and size of audience exists for the content or measure the amount of content generated by various socioeconomic groups. However, the advantage of analyzing self-reports of content production is that it captures all classes of American adults, not just the upper class, which tends to produce most of the popular blogs (Hindman, 2009). This analysis, therefore, is able to study who can and cannot afford to blog, for example, not simply evaluate the content of those who can afford to blog. Another limitation is that the object of study is a moving target. Digital technology continues to evolve and emerge, so studying adoption rates for even one activity is problematic. However, this study includes a wide variety of productive uses, regardless of the latest technological toy. Therefore, the findings allow for a more generalizable claim that a digital production gap exists, rather than limited to an argument based on one activity.

4 Conclusion

The Internet has, indeed, expanded the opportunity for Americans to contribute to the digital public sphere. For some, it has brought people out of isolation, whether geographically or personally. User-generated content on all types of topics, certainly political issues, has proliferated on the Web. However, as creative content applications and uses have grown, the poor and working class have not been able to use these production applications at the same rate as other uses or users, creating a growing production divide based on these elite creative functions. Regardless of the type of activity, a critical mechanism of this inequality is consistent and high quality online access at home, school or work and having a high-status information habitus and Internet-in-practice. These cultural and material factors are more significant for the production of online content than they are for consumption.

The importance of education is not new with digital inequality research, as one's education level is tied to literacy. However, mirroring other recent research (i.e., Zillien and Hargittai, 2009) my study shows that it is not simply a question of digital literacy proficiency leading to production. Educational level is a measure of class, which is associated with class-based mechanisms, such as digital or cultural tools. In short, education has implications beyond literacy.

When people are able to access a computer at multiple places, or with multiple gadgets, frequently throughout the day, they have more control over the production process, and can produce more content. One implication for these results is that access at a location over which economically disadvantaged people have no control, such as a library or school, limits their likelihood of producing online content.

Future research should examine the economic, political and cultural implications of digital production inequality, as well as the qualitative processes and practices of the gap.

Producers of online content are certainly more diverse than the privileged European men who debated within Habermas' public sphere. However, these results challenge theories that the Internet has created an egalitarian public sphere with voices representative of the general public. Rather than put rely democratizing the media, it perpetuates the mainstream media's dominance of elite voices. Getting online does not automatically lead to content production.

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Appendices. Supplementary data

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