

## APPLYING COMMUNICATION THEORY TO DIGITAL DIVIDE RESEARCH

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### ABSTRACT

*Most research on the Digital Divide focuses on recording the presence or absence, closure or widening of gaps in access and usage. Researchers who document trends in Internet usage gaps contribute valuable information to the field, but the binary nature of the arguments often avoids or blocks theoretical progress that could potentially explain the significant consequences of these gaps – most of which have been shown to be positive in the literature. Although some data support arguments that the gaps will resolve themselves, much available data shows that some significant gaps are worsening.*

*Several communication theories, including Diffusion of Innovations, the Increasing Knowledge Gap and Structuration Theory and its variants, are applied to the issue of the Digital Divide in an attempt to provide researchers with a useful guide to understanding the implications of the gaps which are widely known to persist. Rather than endlessly debating the demographics of access and ownership, scholars should agree that some people are online and some are not, and concentrate future efforts on understanding the consequences of this difference.*

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Much has been made in recent years of the Digital Divide, which consists of gaps in Internet or computer access and usage among various demographic categories such as age, gender and ethnicity. Some academics and policy analysts argue that these gaps will close naturally over time as a result of natural marketplace dynamics. They support this argument by citing studies which show that previous information and communication technologies (ICT or IT) “have nots” are increasingly becoming “haves.” Scholars who argue that the Digital Divide is persistently problematic cite data which indicate that many of the gaps are stable and that some have been increasing. They support their argument using the same sources of data as those who argue that the Digital Divide is a non-issue.

If there were no significant benefits to IT usage or any important negative consequences to non-usage, there would be little to debate other than percentage point differences in access and usage over time for various groups. However, numerous communication scientists have argued that there are tangible benefits to using IT and there are, in fact, important problems with having large numbers of people with poor or no access and usage. At the heart of the debate remains the question of whether or not unequal access to IT for some members of the community results in what Tranter and Willis (2002: 2) refer to as “structured social inequality.” Others have described this type of inequality as a situation in which new communication and information technologies strengthen the societal influence and power of those with the most resources (van Dijk 1999). This situation, they argue, results in those with high levels of power participating in far more decision making in society than those with lower levels of power. They are concerned that these divisions could become permanent societal structures and produce a “real threat to democracy” (van Dijk 1999: 236), as well as a society in which unequal access to valuable resources is the norm. Whether such concerns are warranted may depend on how communication theories are used to sort out the rhetoric of the Digital Divide debates.

However, most Digital Divide research focuses on whether or not the gaps exist and whether or not they are closing. This is true despite the fact that there are enough data to document the existence of the gaps, as well as to prove that though some gaps are closing, many continue to persist or increase (van Dijk and Hacker 1999, forthcoming). Communication researchers who argue that gaps are or are not closing, or that gaps do or do not exist, have abundant empirical evidence to support their claims. However, the binary nature of the arguments tends to discourage or block theoretical progress on the larger subject of what communication significance there is to differential access and usage.

Researchers who argue that the gaps will close themselves have some theoretical basis for these arguments. However, there are also theoretical means to challenge their conclusions. Several longstanding communication theories can be applied to the Digital Divide research in an effort to explain the

implications of the already-proven gaps. Rather than debating the demographics of access and ownership, scholars should acknowledge the reality that some people are online and some are not, and then devote more attention to understanding the consequences of this situation.

### **EXISTING GAPS**

Approximately ten years of research shows that there are numerous gaps between those who possess and use interactive communication and information technology and those who do not. Data collected by the U.S. National Telecommunications and Information Administration's (NTIA) 2002 study, *A Nation Online*, shows that while Internet use among some groups has increased since the 2000 report, *Falling Through the Net: Toward Digital Inclusion*, many groups still lag far behind the majority in access to and use of the Internet and computers. For example, in 2002, *A Nation Online* documented that in 2001, 60% of Anglo-Americans used the Internet from any location, while only 40% of African-Americans and 32% of Hispanics had done the same (*A Nation Online* 2002). This amounts to gaps of 20 points and 28 points, respectively. Similarly, only 25% of households earning less than \$15,000 per year used the Internet in 2001, and only 33% of those with incomes between \$15,000 and \$24,999 had accessed the net (*A Nation Online* 2002). When compared to the 67% of users with income from \$50,000-\$74,999 and the 79% of users with income exceeding \$75,000 per year, one finds gaps ranging from 34 points to 54 points between those who have used the Internet and those who haven't. Over 80% of those who have attained a bachelor's degree or beyond accessed the Internet in 2001, compared with 13% of those who did not earn their high school diplomas, and 40% of those who earned only their high school diploma (*A Nation Online* 2002). Data reporting the age of Internet users also demonstrates gaps. While over 60% of citizens aged 9-49 have used the Internet, only 37% of those aged 50 and over have (*A Nation Online* 2002).

### **THE BENEFITS OF ONLINE COMMUNICATION**

Gaps among demographic groups in relation to their Internet communication, computer network usage, and new communication technology networks need to be explained and not merely described because members of online networks can obtain numerous significant benefits from their online communication.

Bikson and Panis (1995) discuss empirical evidence indicating that those who utilize IT possess more accurate information than their peers. This is confirmed by Katz and Aspden (1997), who found that Internet users cite the ability to find information as a key motivation for using the Internet. According to *A Nation Online* (NTIA 2002), over 67% of those who accessed the Internet did so to find information about goods and services and 62% did so to find

information about news, weather and sports. Some users of the Internet have found it useful for finding medical information that can supplement messages from their physician (Kling 2000).

Users are also able to find valuable information related to their economic and occupational situations. Job-related benefits of Internet usage include the ability to search for employment, which 16% of users do (*A Nation Online* 2002). Individual users are able to obtain financial benefits from usage. Increasingly, Americans are using the Internet to file their taxes, conduct financial transactions, and learn about financial opportunities (Bikson and Panis 1995; Hacker and Steiner 2001).

Internet users also obtain interpersonal benefits from their connectivity. Katz and Aspden found that the ability to communicate more with others was a key social benefit of Internet use (1997). Hacker and Steiner (2001) indicate that Internet users can increase their level of communication with families and friends and make new contacts via IT. Bikson and Panis (1995) found that affiliation was an important benefit of Internet use. Rather than simply using the Internet as an information-seeking tool, users look for others with similar interests to discuss and/or debate the information with. The dominant activity of computer users is emailing (*A Nation Online* 2002). Interpersonal communication via email has been found to be a strong determinant of continued use of the Internet (Kiesler, Kraut, Mukhopadhyay and Scherlis 1997). Of those who used email more heavily than those who used the Internet for other purposes, 85% continued using the Internet after one year, compared to less than 70% of those who were not heavy email users. One reason given for this is that email maintains ongoing relationships (Kiesler et al 1997).

In addition to the benefits enjoyed by individual users, these new networks may be creating systemic changes in the organization of society. The ability to form powerful new social networks has provided the potential to organize and reorganize existing social, economic and political conditions. The social level influences of the Internet may become more apparent as society becomes increasingly organized around interactive communication technologies.

Economic competitiveness and productivity are now measured by the ability to generate, process and manage knowledge quickly (Castells 2000). The international economy is now electronically interconnected in ways that allow major economic forces to centralize certain corporate functions such as administration and planning, despite temporal and geographic constraints while decentralizing other functions. Simultaneously, they are increasing their organizational networking with IT. This enables them to connect with and work more closely with those companies spread far apart geographically. Small and medium-sized businesses are also able to compete more effectively with larger organizations via IT because they are able to reach distant consumers more effectively (Bikson and Panis 1995). Small businesses can now connect with larger corporations through IT and become part of their network, fulfilling the needs of these corporations without becoming part of them. Similarly, they can

connect with other small businesses and geographically distant consumers to increase their level of accessibility, efficiency and resulting profits. These observations indicate that usage of the Internet is at once offering economic benefits for individual users and also altering the nature of the economy.

One of the most significant areas of exploration in Digital Divide research has been in the political benefits gained by Internet users. Users participate in civic matters more than non-users (Bikson and Panis 1995). Members of society considered to be politically and/or socially disadvantaged engage more in discussion and leadership roles, challenging off-line status divisions when engaged in IT (Bikson and Panis 1995). Hacker and Steiner (2001) point out that Internet users are able to obtain valuable political information useful for learning about or keeping informed of political issues. Bimber (2001) found that 55% of those with Internet access used the Internet for some type of political purpose, with 37% of those using it to learn about a political issue. Tranter and Willis (2002) argue that the Internet may serve to alter existing political organization by engaging social groups not engaged in previous forms of civic participation.

While the exact nature of Internet effects on politics are not yet proven, there are indications of many positive political benefits to IT and Internet usage. These go far beyond the mundane advantages of easy document positing and retrieval. One technological advantage is the hypertextual structure of the World Wide Web in which cross-referencing between sites, documents and people is made easier than ever before. Another technical advantage is the many-to-many nature of the Internet. This allows each user to be both sender and receiver of political messages at the same time and with unlimited numbers of people (Johnson 2003).

The Digital Divide aspects of using IT and the Internet for politics are highlighted in Johnson's (2003: p.3) observation that: "The Internet can give power to the less powerful, and it can increase the power of the already powerful. It all depends on who uses the Internet and how". Using the Internet for political communication allows people to bypass some of the agenda setting and gatekeeping effects of mass news media (Anderson 2003; Johnson 2003). Anderson (2003) argues that the Internet makes it possible to make political contacts and form political affiliations that would not have been possible before this technology. A study by Hill and Hughes (1998) found that those who engaged in political debate and/or posted political messages on message boards and newsgroups were younger and less likely to be Anglo-American than the general public or other Internet users. Without theory, the Digital Divide appears to be a matter of technological access alone. Looked at theoretically, however, the Digital Divide appears to involve strong issues of social networking, formations of new forms of affiliating, and new means of networking to organize social, economic and political actions.

As there are specific benefits of IT for those who are digitally included, there are negative consequences for those who are excluded from newly

emerging forms of online communication. There is a long line of arguments made by communication scientists about the dangers of exclusion from new communication technology networks. Their work and theories can provide a useful tool for examining the possible long-term social disadvantages for those who lag behind in the Digital Divide. These disadvantages include not only being excluded from specific benefits described above, but also of being left out of new communication networks in ways that increase their exclusion from societal systems that are increasingly reliant on IT.

#### **APPLYING COMMUNICATION THEORY TO DIGITAL DIVIDE RESEARCH**

*Diffusion of Innovations Theory:* Some Digital Divide naysayers present theoretical arguments for eventual and perhaps inevitable closure of Digital Divide gaps (Compaine 2001; Crandall 2000). Comparing eventual widespread adoption of technologies such as television, radios and the telephone, Compaine argues that the nature of the marketplace dynamics will eventually close the gaps without interference from policy-makers. Drawing on Roger's Diffusion of Innovations Theory (1986), Compaine (2001) argues that technologies initially are adopted by those with plentiful resources, and these early adopters drive the cost down for those with fewer resources, making access an increasingly viable option for those who cannot afford the initial investment. Despite the fact that he still points out some gaps that are present, Compaine draws upon the dramatic decreases in the cost of computers and Internet services in recent years, as well as the increases in the number of minority groups online, to support this argument. This leads to the conclusion that the Digital Divide really isn't a problem; rather, it is a natural progression of the market and will resolve itself given time.

An important flaw in these arguments is found in the nature of the Internet. The Internet and IT in general are not the same as previous communication media. While the telephone facilitates interpersonal communication, and the television and radio facilitate mass communication, Internet usage has both mass and interpersonal communication benefits (Allbritton and Rogers 1995). Audience members can access select information that reflects their interests, network with others who share their interests, debate information, and even work as activists for social change through the Internet. Another unique aspect of IT is that while advances in telephones, radio and television fall along the lines of improved quality, advances in IT allow for increasingly complex tasks, requiring a cumulative set of sophisticated digital skills. With personal computers, people were able to employ basic data applications, such as word processing. With the emergence of the Internet, there was an unlimited space to share information, exchange messages, and store files. E-mail technologies allowed new forms of interpersonal communication and network formation. After the Internet, the World Wide Web and hypertextual communication emerged and facilitated more networking,

easier document viewing and retrieval, and vastly improved means of searching and providing for information. These new communication technologies advanced rapidly and required computer and computer network resources, skills, experience and access that are hardly comparable to owning a radio or TV set.

Rogers (1986) has argued that the adoption of interactive communication technologies such as IT systems is not comparable to older communication technologies such as television for several reasons. In general, communication technology innovations follow an S-curve of adoption, wherein each new technology is adopted by a very few at first, then much of the population as it reaches a high rate of penetration, and slowly by the few remaining late adopters. However, newer forms of communication technology, such as IT and the Internet, may create a series of dependent S-curves due to their rapidly-evolving nature and the cumulative digital skills required to put them to effective use. According to Rogers, the rapid evolution of technology may serve to increase existing information gaps. In essence, those who have been using the Internet are developing an increasingly sophisticated set of information seeking and processing skills, and gaps between these advanced users and the late adopters who possess only basic skills are likely to expand.

Thus, instead of a single S-curve of adoption there are successive S-curves based upon skills, not just access to equipment (Rogers 1986). Van Dijk (1999) reinforces this argument in his discussion of usage gaps. Because digital skills are cumulative, van Dijk (1999) argues that advancements in technology create situations in which those who are limited to a very basic level of skills now will be outpaced by those who are ahead in the ability to select and process information.

The arguments of Rogers and van Dijk can be seen as related to older arguments made over thirty years ago about knowledge differentials among high and low educated people attending news. The original Knowledge Gap Hypothesis argued that research showed that an increase in news flow on a particular topic was accompanied by a greater acquisition of knowledge about that topic among those most educated (Tichenor, Donohue and Olien 1970). While everyone may become more knowledgeable about the topic, the expansion of knowledge is relatively greater for the most educated, and the gaps between those who are highly educated and those with low education increase as media coverage increases (Tichenor, Donohue and Olien 1970). Assumed causes for this gap in knowledge were attributed to differences in communication skills, stored knowledge, social networks and selective exposure. Knowledge Gap Hypothesis researchers argued that people with higher levels of education have better abilities to gain information, comprehend information, discuss topics with other people, and attend messages that may contradict stored attitudes (Tichenor, Donohue and Olien 1970). They also argued that highly educated people are more likely to have paid attention to news topics in past coverage and therefore have an easier time processing current news (Tichenor, Donohue and Olien 1970). Additionally, the researchers contended that the

gaps could be functional if the people at the higher levels acted beneficially toward everyone else. According to the Knowledge Gap Hypothesis, as more mass media information circulates through society, those in higher SES categories acquire at faster rates than those at lower levels (Gaziano 1995). Over time, the hypothesis was challenged with the arguments made by some researchers saying that there are numerous inconsistencies among studies on this topic. In her review of over 90 research articles on the subject, however, Gaziano (1995) notes that knowledge inequalities appear to be an enduring phenomenon.

Evidence for such knowledge gaps is not difficult to find. Although the gender gap in computer access had narrowed considerably in 1998 (*A Nation Online 2002*), a study of American children that same year determined that females were much more likely to use computers only for basic applications, such as word-processing, while males were more likely to engage in advanced applications, such as programming and problem-solving (American Association of University Women). Van Dijk (1999) argues that the inability to select and process information under current technological conditions will continue to impede the user as technology evolves. For example, those who are currently able to create and share content online will maintain a learning pace consistent with technological evolution (e.g. increasingly complex software), while those only now learning to search for and retrieve information on the Internet will forever be playing catch-up.

Evidence of additional gaps beyond basic access, such as those in frequency of use, are also found in the literature. Since there are significant, nontrivial benefits of Internet usage (Bikson and Panis 1995; van Dijk 1999), those who use IT more frequently and with more intensity are likely to receive more benefits. Van Dijk (2000) indicates that Internet skill level affects level of usage. Hacker and Steiner (2001) found that those who have access to the Internet do not necessarily use it; rather, a combination of skills, opportunities, and comfort indicates likelihood and frequency of use (Hacker and Steiner 2001). Efforts are being made to increase the opportunities for Internet access by making it available at locations such as public libraries, and the decreasing cost of access may be responsible for narrowing the access gaps. However, skill and comfort gaps persist. Researchers have noted that significant numbers of non-users find using the Internet to be confusing or difficult (van Dijk 1999; Hacker & Steiner 2001).

Quality of access is another factor in usage frequency. Pew researchers found that high-speed access was the most significant factor determining intensity of Internet usage (Horrigan & Rainie 2002). Applying Diffusion of Innovations theory (Rogers 1986) to Digital Divide research and policy debates helps an understanding of the consequences of current gaps. It also prevents theorists and policy analysts from making oversimplistic conclusions about what the gaps tell us about how communication is being affected positively or negatively. Having argued that Digital Divide research continues a decade-long

debate about gaps statistics and that communication theory can help explain the existence of the most commonly agreed upon gaps, the focus of this article now turns to some specific relevant theories to explain the long-term social implications of the gaps.

*Structuration Theories:* Symbolic interactionists have long argued that society does not exist as an entity external to those who comprise it. Rather, it is created, altered and maintained by the human communication that occurs within it (Maines 1977). The organization and rules of society are negotiated by its members, who often have competing interests. They must communicate their concerns and negotiate their shared rules and values. The outcome of such negotiations is what is called society. This type of negotiation occurs at all levels of the social system. What is negotiated is the pattern of resources and constraints that define the context and the relationship among the contexts (Maines 1977). Those people with more resources can achieve their desired ends more readily than those with fewer resources. Building on symbolic interactionism, Structuration Theory (Giddens 1984) offers insight into the ways communicators create social systems and are bound by them. According to this theory, communicators act according to rules in order to achieve their goals. The rules are created through social interaction and serve to constrain the behaviors of members of the society therein.

Adaptive Structuration Theory, a theory used by communication scientists who study IT, is derived from Structuration Theory. According to DeSanctis and Poole (1994), members of a group adapt rules and resources which they perceive to be necessary to accomplish their goals. Rules are defined as formulae or guides for actions, and resources are all the things people bring into interactions, including dispositions, abilities, knowledge and technologies such as IT.

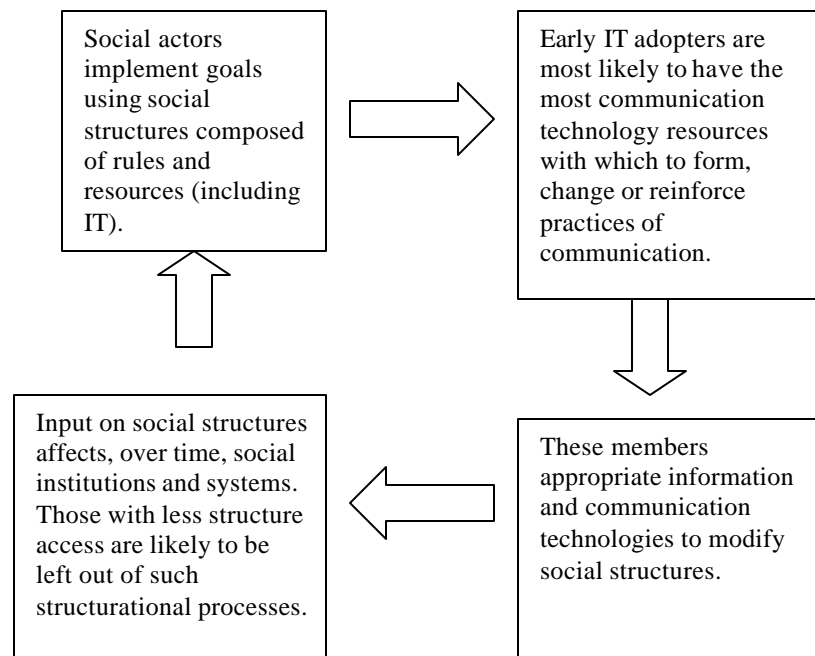
According to Adaptive Structuration Theory, society and its rules and resources are reproduced when member's actions reinforce the systems they have created or that existed prior to the use of a communication technology. There is a 'duality of structure' inherent in this as the rules and resources both affect and are the outcome of the interaction. Appropriation occurs when rules and resources are taken from a larger social context, as when a group takes on rules from the larger organization. When interacting via IT, users appropriate a society's rules and resources, and they utilize the technology in accordance with them. Essentially, technology is used in ways that work to increase the resources of the users. Because efficient social networking and processing of information are resources highly valued by society (Castells 2000; van Dijk 1999), technology is rapidly evolving in order to facilitate them. Both the structure of IT and the appropriated social rules and resources result in the reproduction of the roles, rules and resources that exist outside of the technology. Those with power and resources outside of the IT context are the primary early adopters of the technology. They use the technology to meet their

needs, and the resources and rules they brought into the IT context initially served to shape the roles and rules of those interacting via IT. This serves to reproduce the existing power relations in the social system and even strengthens them, as it opens up a new channel from which those without power and resources are further excluded. This suggests that the rapid evolution of IT, which meets the increasing demand for the more sophisticated and efficient processing of information determined to be valuable by those who negotiate what has value in society, has ensured that those already possessing sophisticated resources and skills continue to shape the technology. The outcome is a technology that primarily meets the needs of those who adopted it first, and the unintended consequence of this is that those already excluded fall further behind. Figure 1 demonstrates how the process of Structuration via IT influences social organization.

According to structurational theorists, technologies are intended to allow equal opportunities for users. DeSanctis and Poole might view the outcomes described above as a form of ironic appropriation. For example, those members of society already excluded from participation in much of society, such as those at the low end of the income spectrum, are being excluded from improving their situations because they are excluded from opportunities to change society's rules and resources.

The concerns of structurational theorists are echoed by Castells (2000) in his arguments about "network society". In Castell's formulation of a network society platform or social system, members of a society are nodes of a social system network that has nontrivial organizational consequences for the lives of each member (Castells 2000). Nodes join with other nodes with similar resources and interests in the network. If a node does not connect to other nodes, via communication, it may be dropped from the network. Nodes that connect with others can form influential networks that may serve to alter the organization of society. Those who are not connected to the network of society are excluded from influencing its organization as, according to Castells, those left out of any one "layer" of society have no part in creating or influencing the other forms of social organization, including economic and power relationships because they are all interdependent and a change in one affects the others. Thus, those with the resources to effectively utilize information technology to network are the negotiators of a society, while those without these resources are excluded from another opportunity for social influence.

If certain members of society have access to the information and benefits that the Internet provides, the technical skills to use the access optimally to improve their life situations, and the ability to alter social structures that produce change in social institutions, while other members of society do not, new status divisions may emerge in society between those who have and can use the technology and those who are excluded (Tranter and Willis 2002). IT users

**FIGURE 1: A STRUCTURAL MODEL OF DIGITAL DIVIDE GAPS EFFECTS**

are able to build social networks, connect with others without concern for geography, and influence existing elements of society, such as governments and organizations (Tranter and Willis 2002). This is the networking ability Castells refers to, and it is the key to the creation of either structured inequality or structured equality.

The work of van Dijk (1999) lends further insight into the structural inequalities that may be the unexpected consequence of unequal IT adoption. According to van Dijk (1999), modern society is in the process of becoming a society which organizes its relationships around communication networks, or connections among members of society and its structures. Van Dijk (1999: p.220) argues that once members are connected to networks, the networks have the ability to connect all levels of society, bridging the divides between interpersonal, organizational and mass communication, effectively bringing the "whole world' into our homes and workplaces".

Van Dijk (1999) contends that IT is a context in which multiple types of social interaction occur, making it an intricate part of societal organization. As such, it reflects and may intensify existing societal stratification, including existing information inequalities, as those who have the resources to adopt the technology, and thus shape it, are the ones who are networking at a rapid pace. Exclusion from important new technologies may constrain both economic and social power opportunities as the ability to use them is of utmost importance in a networked society in which communication technologies are increasingly being used to shape the organization of society as a whole (van Dijk 1999).

Keane (2000) provides an explanation for why the ability to network via the Internet has such a powerful impact on the organization of society. According to his arguments, public spheres serve as a platform for the negotiations that comprise society. Micro-public spheres are those spaces, "in which citizens enter into disputes about who does and who ought to get what, when and how," (Keane 2000: p.77). Modern microspheres are concerned with the way societies handle information and produce and sustain meaning among their members. At the local level, members of these spheres serve to define and redefine symbolic differences through communication. Together, citizens question the motives and wishes of those in power and challenge them with alternative possibilities. Members of micropublic spheres are able to network with members of similar values to discuss and create new social dynamics (Keane 2000). As they grow in strength and network with others, these local-level microspheres become public mesospheres with the potential to affect change at a national level. If these mesospheres network with others they can become, or become encapsulated in, macrospheres. These spheres are highly regulated and global in structure, allowing members to challenge power structures beyond the limits of their own societies. Global media companies regulate these spheres and alter society by creating a space for the discussion of power controversies among millions of people (Keane 2000). The Internet is one such type of macrosphere because it counts hundreds of millions of citizens among its users (Keane 2000).

Like Castells, Keane points out that IT has changed much of society because it allows citizens to move beyond the traditional idea of public sphere (i.e. a place in which citizens can engage in discourse free from both economic and political constraints and engage in controversies regarding power relationships within their social systems) as being bound by geographical restrictions. New spaces of communication are being created by new communication technologies, including IT networks. These spheres exist among small groups at a local level, but can provide much stimulation of change at the macro, or global, level.

The key point here is that IT allows for the creation of new public spheres without the constraints of geography, time and political interests, allowing users a chance to connect, to network with other users and to recreate the structure of society by renegotiating rules, roles and meanings. However, offline inequalities have the potential to become online ones as the rules and resources that existed prior to the mass utilization of IT are adapted via IT, and the members of society currently structuring IT are those with resources outside of it.

The arguments made by Castells, Keane and van Dijk are useful in understanding the societal implications of the Digital Divide. Although they approach the problems of technological exclusion in distinct ways, they share a common theme: that is, communication technologies can be used to create, alter, maintain, and reproduce existing social systems. Their shared theme is

what communication theorists refer to as structuration. These theories each contribute to the idea that rather than being simply another medium of communication, the Internet is an instrument for influential networking, organizing and making institutional changes.

#### *CONCLUSION*

The use of communication theories for explaining the implications of the Digital Divide here has drawn mainly on three of them – Diffusion of Innovations Theory, Castell's arguments on network society, and Adaptive Structuration Theory. The main focus of each of these theories, as well as the theories that further understanding of their implications on the Digital Divide, are summarized in Table 1.

From Diffusion Theory, it is clear that communication technologies are never adopted en masse in a short amount of time but rather follow S-curves where early adopters who have the most personal resources first adopt the technology and then others follow suit over numerous years. One knows not only that there are S-curves for each communication technology, but also that there are successive S-curves as these innovations are released rapidly. As Rogers (1986) notes, today's communication technologies not only follow these successive curves, but the newer technologies require resources that differ from older technologies.

Castell's presentation of the network society argument informs one of the crucial nature of IT access and skills for participation in social formations that are rapidly changing from offline only to hybrids of offline and online organizing and work. From Adaptive Structuration Theory, one can glean the knowledge that IT can function as a key resource in important processes of social interaction within the network society systems. Those with the most access and ability to influence changes in social structures, which produce social systems over time, will have influence and benefits that are increasingly unavailable to those who are offline.

**TABLE 1: THE CENTRAL CONCERNS OF THEORIES/ARGUMENTS APPLIED TO DIGITAL DIVIDE**

<b>Theory</b>	<b>Central Concerns</b>
Diffusion of Innovations (Rogers 1986)	Those with more resources adopt technologies first. New interactive technologies create a series of successive knowledge gaps.
Knowledge Gap Hypothesis (Tichenor et al 1970)	Knowledge of use of adopted technologies is greater for those with higher socio-economic status and those already well informed.
Network Society (Castells 2000)	Society is becoming increasingly networked because of the influence of technology. These networks are causing important changes at all levels of society.
Public/Private Spheres (Keane 2000)	Social networks can alter power structures in society. New communication technologies serve as a platform for these networks.
Structuration Theory (Giddens 1984)	Society and its rules are created, altered, and maintained through human communication
Adaptive Structuration Theory (AST) (DeSanctis & Poole 1994)	IT has the potential to increase the resources of both those who had them prior to its adoption and those who possessed fewer resources prior to its adoption.

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