

Digital Inclusion: The Way Forward for Equality in a Multiethnic Society

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ABSTRACT

The present study explores how youth as citizens in a multiethnic and multireligious society in Malaysia use the Internet to accelerate their economic and political participation. Data for this study was collected through a set of questionnaires administered to 600 respondents, whose ages ranged from 18 to 40 years, all residing in the suburbs of Kuala Lumpur, the capital of Malaysia. The findings indicate that about half of the respondents had the experience of using the Internet for more than four years. The ethnic Chinese who have high access to the Internet also used commercial and government online facilities more frequently than other ethnic groups. There was no significant difference with regard to using online educational and entertainment facilities or with regard to political participation. There were no significant differences among the ethnic groups. The findings indicate that the online facilities have contributed to the leveling of active participation among ethnic groups in political matters. However, gaps still exist with regard to commercial and public sector online activities among the ethnic groups.

Keywords: digital inclusion, political participation, Internet usage, digital divide, social equality, capital enhancing.

Introduction

Internet penetration is on the increase in many countries. There are two billion Internet users worldwide, an increase of 480 percent from the year 2000 to 2011 (Internet World Statistics, 2011). For developing countries, investment in information and communication technology (ICT) infrastructure is important as a means to close the development gap with developed countries. During the industrial revolution, many currently developing countries were peripheral satellites of major empires. They supplied raw materials required by industries in the developed world and provided ready markets for finished goods. This relationship caused the underdevelopment of the current developing countries (Frank, 1990). The contemporary communication revolution provides an opportunity for the developing countries to level the playing field or to leapfrog their development so as not to be left farther behind. Unless developing countries are linked to the digital orbit, they cannot participate positively in the global networking and can never catch up with the developed world.

For the privileged, the Internet has become an integral part of daily life. The Internet has two main functions for its users: as a resource and as a means of communication. Similar to any investment, it is important to ask: what is the return of investment in ICT to society and the country? As a resource, the Internet provides information and knowledge, as well as entertainment. As a means of communication, it expedites networking, transactions, and participation in discussion. As a country, adoption and accelerating use

of digital technology is of critical importance to move toward a digital society or information society.

Livingstone and Helsper (2007) discussed three potential outcomes from the new media: (1) the sceptical viewpoint that Internet use contributes to the destabilization of the public sphere; (2) a middle view that Internet communication complements and encourages traditional political participation; and (3) an optimistic view, suggesting that the Internet actually creates new ways in which to participate. The Internet has not only democratized the sources of information as well as the means of communication, but also acts as enabler for citizen participation (Rabler & Huber, 2010), creating a more informed society (Polat, 2005). It supports a lot of opportunities for enlarging or maintaining social networks (Hargittai & Hinnant, 2008) and for social support (Hlebec, Manfreda & Vehovar, 2006), and it has the potential to strengthen social relationships and to enhance democracy and increase participation (Sylvester and McGlynn, 2010; Norris 2001). The Internet has empowered citizens by making more choices available (Livingstone & Lunt, 2007), providing for important new citizenship practices (Hermes, 2006), and greatly contributing to increased attention, and involvement online (Shah et al., 2005).

Merely having access to technologies, however, will not bring about desired social, economic, or political changes. If the Internet is to be a catalyst for social change, what criteria of usage should be encouraged? Van Dijk (2005) suggests three usages of Internet that includes, for work, education, and entertainment. Alternatively, Internet usage could be categorized as a means of resource retrieval, communication, entertainment and business transactions. Information technology has not only revolutionized the way individuals learn and earn a living, but has also provided new avenues for communicating and participating in the nation's social and civic life (NTIA, 2000).

Several studies have focused on “capital-enhancing” uses of the Internet (DiMaggio and Hargitti, 2002) because it offers users of opportunities for upward mobility and enhances individual life’s chances. Such usage will also enhance political participation and career advancement (Bakker & de Vreese, 2011; Samsudin, Latiffah & Ali, 2011). Previous research has found that Internet use is associated with heightened, rather than diminished, social capital for users (Menexes and Aslanidou, 2006 ; Katz and Rice, 2002), political and civic participation (Bakker and de Vreese, 2011; Wellman, Haase, Witte, and Hampton, 2002), and knowledge of current events (Shah, Cho, Eveland and Kwak, 2005).

Studies have shown that majority of Internet users belong to the younger generation especially those between the ages of 19 and 25 years. They are called “digital natives” or the “Net generation” (Bennett, Maton, Kervin, 2008). These young people are said to have been immersed in technology all their lives. Hargittai and Hinnant (2008) suggest that a digital generation could be a myth because researches envision the Internet being used for homework, educational, and information seeking, and connecting with friends. It’s benefits, however, are also based on demographic factors, interest, and relevancy with which each individual uses the Internet. Just as the mass media offer a wide range of choices in their programs, an Internet user will choose a specific program to fulfill their diverse needs and desires.

As investment in the Internet infrastructure increases, so does the issue of digital access. Van Dijk (2003) has demonstrated that in terms of physical access to computers and the

Internet, the digital divide is closing in developed countries, whereas in developing societies it is still growing. In terms of skill access and usage access, the digital divide is both widening and deepening. Digital divide is a multidimensional phenomenon. Wilson (2006) attributed the digital divide to lack of finance, content, cognition, benefits, and institutional access. Norris (2001) relates digital divide to several consequences such as global, social, and democratic divide. Rice (2002: 106), for instance, describes the digital divide as ‘differential access and use of the Internet according to gender, income, race and location’.

Definitions by other authors focus more on the gap between users and nonusers. For instance, Mehra et al. (2004) defined the digital divide as “the troubling gap between those who use computers and the internet and those who do not.”. Chen and Wellman (2003) suggest a conceptualization based on factors of access and use, weighted by socioeconomic status, gender, life stage, and geographic location. Nahon (2006) argues that monotypical indices are more widely available in measuring digital divide, and suggests policymakers need to promote comprehensive indices over monotypical indices. Boonaert and Vettenburg (2011) suggest that the “divide” is not about accessibility, but actually due to diversity of expression and meaning given by young people to their digital lifeworld.

Livingstone (2003) suggests that studies need to explore beyond the focus on access to investigating in detail the nature and quality of use as well the relevant social conditions. The real issue is not so much about access but more about inequality. Because of different interests and usage of Internet, some segments of society might benefit more than the others. Rather than insisting on the digital divide, efforts must be made to encourage all possible segments of society to positively use the Internet for capital-enhancing activities. There is now concern about social inclusion. Digital inclusion encompasses not only access and skills to use the Internet but also to participate and benefit from the knowledge and information that can be retrieved from the large networks of databases.

Issues raised by concern about social inclusion comprise the barriers for inclusion that include gender, geographical locations, and socioeconomic status. But not many studies were focused on the need to encourage ethnic inclusion. Ethnicity is always subsumed under certain socioeconomic characteristics or under geographical factors such as the rural-urban split. The real issue about ethnicity and its role in social transformation is not always highlighted. In addition, computer and Internet technologies provide a variety of communication methods such as electronic-mail, instant messages, list-serves, and chat-rooms, placing youth who lack access to or skills in using IT at a social disadvantage (NTIA, 2000).

The activities of the various groups suggest that those with the longest and most frequent users of the Internet are most likely to engage in activities from which they may benefit. Although length of experience and frequency of at-home logging-on are said to be the most useful predictors of people’s preferred activities online (Howard et al. 2001), the level of skill may also prove to be a significant predictor. Growth in basic user statistics does not necessarily mean that everybody is taking advantage of the medium in similar ways. Here, we explore how young adults utilize the Internet, which may have an impact on their life chances and social participation. More specifically, we distinguish among the

different types of activities people go online for, arguing that recreational Internet usage may not have the same capital-enhancing effects as certain other types of use.

Studies have found that educational background influences people's likelihood to visit capital-enhancing sites (Beaudoin, 2009; Hargittai & Hinnant, 2008). Those with higher levels of self-reported skill are more likely to visit the types of websites that may contribute to improving their life chances and from which their human and financial capital may benefit. As such the differences can be approached in two ways: they can be considered either as gaps or as diversity in use. Depending on how we look at the approach, these differences will have positive or negative connotations. Hargittai and Hinnant (2008) suggest that certain usage is called capital-enhancing activity implies a positive connotation. Jin and Chong (2008) suggest that we should be looking more at inequality of different usage than inequality in access to the internet.

In a multicultural society, achieving equality among various ethnic groups is of paramount importance. Perceived social injustices could be a contributing factor that could spark racial tension and jeopardize social harmony. The advancement in ICT has provided networking to ethnic minorities to enhance their own identity and to help the diaspora (re)connect with their country of origin. Similar to the need for development to catch up with the developed world, ethnic groups need to catch up with the national performance so as not to lag far behind the other ethnic groups.

The advantage of the Internet as a form of communication is that it blurs the traditional boundaries between producers and consumers. It encourages media participation by ordinary citizens in the public sphere (Sylvester and McGlynn, 2010). In the Internet context, it allows for more horizontal communication between citizens. The studies of Chung and Henderson (2005) suggest that some people see the Internet as a "social" technology and use it primarily to participate in online social communication and to expand their social connections. Others might use Internet for its utilitarian functions; that is, as a convenient source of information or as a capital-enhancing activity (Hargittai & Hinnant, 2008).

In Malaysia, the social engineering effort began in 1970 with the implementation of New Economic Policy. The policy has two principal objectives: to eradicate poverty and remove the identification of race with specific residential locations. By this policy, an affirmative action program was launched to correct the economic imbalances of three major ethnic composition of the population. Although the target period of 30 years has passed, the national development policy still inherits the novel objectives in its subsequent development programs.

Malaysia is an active proponent of integrating the usage of ICT in its development. Internet penetration in Malaysia increased from 3.7 million in 2000 to 16.9 million in 2009, an increase of 356% from the year 2000. Based on population, Internet penetration rose from 15% in 2000 to 65% in 2010 (ITU, 2011). The government set up seven initiatives with regard to usage of ICT. Among them are providing e-government and e-business.

With many aspects of life involved in the advancement in ICT, all ethnic groups are encouraged to get the benefits of investment in ICT. The digital inclusion involves encouraging ethnic groups to go beyond access to technology and garner whatever

benefits ICT could bring to their life. In this way, digital technology could be the catalyst for each ethnic group to achieve social and economic equality and move forward to a more equitable, just and prosperous society.

Materials and methods

A total of 600 respondents between the ages of 18 and 40 years were interviewed with a set of questionnaires. They were selected from the suburbs of the capital city of Kuala Lumpur. For the purpose of this study, an equal number of respondents reflecting the three major ethnic groups were selected. Data were collected in the month of March 2011.

With regard to the demographic profiles of the respondents, 51 % were males and 49 % were females. About 26 % were 18 – 25 years old, and 50 % were between 26 and 35 years. The remaining 24 % were between the ages of 36 and 40 years. With respect to their academic qualifications, 31% had secondary school qualification, and the remaining 69% had tertiary education.

The four main variables used in this study are Internet access, experience, engaging in online services, and online participation.

Internet usage was measured by questioning the respondents thus: “Do you have internet connection at home?” For those who do not have access at home they were asked, “Can you have access to the internet at your work place, school or at the community centres?” The respondents simply answered “Yes” or “No”.

Internet experience was measured by asking the respondents “How long have you been using the internet?” There were five response options from “less than six months” to “more than five years”.

Online activities were those related to business transactions (such as online banking and online shopping), government transactions (payment of income taxes, renewal of driving licenses online), education (distance learning, retrieval of materials from online publications), and entertainment (playing games, downloading music or videos). For each item in the four subcategories of online activities, the respondents were given four choices: “never”, “sometimes”, “frequently”, and “very frequently”.

Political participation was measured by asking respondents how often they write emails, give comments, or visit the websites of their respective member of parliament, community leaders, and leaders of nongovernment organizations. There were likewise given four choices: “never”, “sometimes”, “frequently”, and “very frequently”.

Results

Of the total number of respondents that were interviewed, 72% have Internet access in their homes, whereas the rest use the Internet at their workplace, cybercafé, or at the community centers that provide free Internet access. Comparing accessibility by ethnic groups, the Chinese have highest access to Internet at home (81%). Among the Malays, 71% have access to the Internet at home, whereas the percentage for the Indians is at 67% only. The accessibility reflects the socioeconomic standing of each ethnic group.

Table1: Access to internet at home

| | YES | NO |
|---------|-----|-----|
| Malays | 77% | 23% |
| Chinese | 81% | 19% |
| Indians | 67% | 33% |
| Overall | 72% | 28% |

Slightly more than half of the respondents have the experience of using Internet for more than four years, whereas another 28% have been using the Internet between 2 and 3 years. Those considered as new to Internet are those who used Internet for less than a year, which amounts to only 15%. Among the ethnic groups, more Chinese (62%) have experience using the Internet for more than four years compared to the Indians (55%) and the Malays (53%).

Table 2: Experience using the Internet

| | Malays % | Chinese % | Indians % | Overall % |
|-----------|-------------|--------------|--------------|--------------|
| < 1 year | 19 | 13 | 14 | 15 |
| 2–3 years | 27 | 25 | 31 | 28 |
| 4 years | 53 | 62 | 55 | 57 |

With regard to the duration of usage per week, Table 3 indicates that a majority of the respondents use Internet for less than seven hours or an average of one hour per day. Among those who are online for more than seven hours per week, the Malays are the most active users (46%), compared to the Indians (41%) and the Chinese (39%). The majority of the Chinese use the Internet for an average of an hour per day (61%) although they have a longer history of Internet use.

Table 3: Usage of Internet per week

| | Malays % | Chinese % | Indians % | Overall % |
|-----------|-------------|--------------|--------------|--------------|
| < 7 hours | 55 | 61 | 59 | 58 |
| 7 hours | 46 | 39 | 41 | 42 |

With regard to specific use of the Internet, the data in Table 4 indicate that respondents are actively using the online services provided by both the public and private sectors. For the government services (paying traffic tickets or income taxes, renewing driving licenses, and paying taxes to local councils) the Chinese (M=6.39) uses these facilities more than the Malays (M=5.67) and the Indians (M=5.77). The differences between these ethnic groups are significant (F=4.45, p<0.05).

The services offered by the private sectors (e-banking, e-shopping, e-ticketing, e-booking, and e-job) are also getting positive response from the respondents. Again, the Chinese (M=10.51) use these services more than the Malays (M=8.94) and the Indians (M=9.98). The differences are significant (F=8.89, p<0.05).

Table 4: Engaging in online services

| | Malays (mean) | Chinese (mean) | Indians (mean) | F |
|-----------------|------------------|-------------------|-------------------|---------|
| e-government | 5.67 | 6.39 | 5.77 | 4.45* |
| e-commerce | 8.94 | 10.51 | 9.98 | 8.79* |
| e-education | 9.46 | 9.41 | 9.79 | 0.73 ns |
| e-entertainment | 4.72 | 4.83 | 5.06 | 2.05 ns |

With regard to using the Internet for educational services (referring to e-journal, distant learning, and downloading materials for school assignments), the Indians (M=9.79) are actively engaged in educational pursuit compared to the Malays (M=9.46) and the Chinese (M=9.41). The differences, however, are not statistically significant (F=0.75. $p > 0.05$).

The Internet can also be used for entertainment purposes (playing games, downloading songs and videos). Here, the Indians (M=5.06) are more active in using Internet for entertainment. The Malays (M=4.72) and the Chinese (M=4.83) seem less enthusiastic about playing games on the Internet. Again, however, the differences are not significant (F=2.05. $p < 0.05$) indicating that there is not much difference between ethnic groups with regard to entertaining themselves on the Internet.

The emergence of the Internet facilitates, influences and changes the ways citizens participate. The Internet not only has democratized the sources of information as well as provided a means of communication and also acts as an enabler for citizen participation. Another aspect of Internet that is of interest is the extent to which it helps citizens' participation. Data from Table 5 indicate that the Chinese (M=7.40) are more active using blogs to comment on online news compared to the other ethnic groups, namely the Indians (M=7.17) and the Malays (M=6.92).

With respect to citizens' visiting the website of their respective Members of Parliament or NGOs, the Malays are in the forefront (M=9.24) followed by the Chinese (M=9.01) and the Indians (M=8.95). Respondents were also asked if they ever wrote through e-mails to their member of parliament, local leaders, social interest groups; the Chinese (M=8.33) and the Indians (M=8.01) were more active than the Malays (M=7.96). In all the three categories of participation, the differences are not statistically significant at 0.05 indicating that all the ethnic groups show equally active participation.

Table 5: Participation online

| | Malays (mean) | Chinese (mean) | Indians (mean) | F |
|------------------|------------------|-------------------|-------------------|---------|
| comments online | 6.92 | 7.40 | 7.17 | 0.30 ns |
| visiting website | 9.24 | 9.01 | 8.95 | 0.46 ns |
| sending emails | 7.96 | 8.33 | 8.01 | 0.72 ns |

Discussion and conclusion

The increase in accessibility to the Internet has shifted attention from the divide to social inclusion. Some questions that were raised are: What benefits has society gained from access to the Internet? Has any particular segment of society been left out from such benefits? This study has shown that despite differences in the socioeconomic status of major ethnic groups, they have equal access to the new technology. This is made possible through numerous efforts by the government to ensure accessibility to the Internet through a campaign of one house / one computer, tax reduction benefits for the purchase of computers, providing affordable wireless connectivity to both urban and rural areas, as well as providing free laptops to deserving segments of the society.

Accessibility has helped increase capital gain in terms of democratic participation where each ethnic group shows no significant difference in their participation. They also benefited from e-education, which will enhance their knowledge. The only difference among ethnic groups is concerns their participation in e-commerce and e-government where a difference in use among the ethnic groups. Internet usage assessment has moved from mere access to quality of usage which, in this case, proved that the Internet promotes capital-enhancing activities besides its normal utilitarian usage.

This study also suggests that there should be more public sector ICT initiatives that would focus on implementing policy that will improve digital inclusion. Being the major ethnic community, the Malays' accessibility to Internet is crucial in order to achieve wider ICT goals of the country. However, in terms of usage of the e-government services, the Chinese are still ahead of the Malays and Indians. This again requires a shift in policy direction to emphasize inclusion so that more Malays and Indians will use these services. The situation is not different also for the private sector usage where more Chinese are using the online services offered by the private sectors such as e-banking, e-shopping, e-ticketing, e-booking, and e-job.

The Malaysian public sector attaches much importance to education where the use of the Internet for e-learning is seen as crucial. In contrast to the other findings, all the three major ethnic groups are taking advantage of the facilities. The same applies to political participation where the three major ethnic groups take full advantage of the online facilities to participate in political process. By investing in digital accessibility, the government has helped to pave the way for citizens to get involved in the democratic process by commenting on political blogs, write to their representatives, or visit the websites of the party they supported. With the progress on digital inclusion, Malaysia is now seen to be moving towards narrowing the gap of ethnic inequality which in the long run would contribute towards achieving a just and equitable Malaysian society.

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References:

Bakker, T. & C. de Vreese. 2011. "Good News for the Future? Young People, Internet Use, and Political Participation," *Communication Research*, 38(4): 451-470.

Bennet, S., K. Maton & L. Kervin. 2008. "The 'Digital Natives' Debate: A Critical Review of the Evidence." *British Journal of Educational Technology*, 39(5): 775-786.

Beaudoin, C. 2009. Exploring the Association between News Use and Social Capital." *Communication Research*, 36(5): 611-636.

Chen, W., & B. Wellman. 2003. "Charting and Bridging Digital Divides: Comparing Socio-Economic, Gender, Life Stage, and Rural-Urban Internet Use in Eight Countries." AMD Global Consumer Advisory Board. Retrieved December 29, 2011 http://homes.chass.utoronto.ca/~wellman/publications/amd_ses/charting-divides_long.pdf

Chung, W. & J. Henderson. 2005. Americans on the Internet: Utilitarian and Social Participation Perspectives. *Working Papers on Information Systems 1*, 1(16). Retrieved on September 15, 2011 at <http://sprouts.aisnet.org/1-16>.

DiMaggio, P. & E. Hargittai. 2002. "The New Digital Inequality: Social Stratification among Internet Users." Paper presented at the American Sociological Association Annual meetings, Chicago.

Hargittai E. & A. Hinnant. 2008. "Digital Inequality: Differences in Young Adults' Use of the Internet." *Communication Research*, 35(5): 602-621.

Hlebec, V, K. Manfreda & V. Vehovar. 2006. "The Social Support Networks of Internet Users." *New Media and Society*, 8(1): 9-32.

Howard, P. N., L. Rainie & S. Jones. 2001. "Days and Nights on the Internet: The Impact of a Diffusing Technology." *American Behavioral Scientist*, 45(3): 383-404.

Internet World Statistics. Retrieved December 28, 2011 from www.internetworldstatistics.com.

Jin, J. & P. Cheng. 2008. "Measuring Digital Divide: The Exploration in Macao." *Observatorio Journal*, 14(1): 23-39.

Katz, J. E., & R. E. Rice. 2002. *Social Consequences of Internet Use: Access, Involvement and Interaction*. Cambridge, MA: MIT Press.

Livingstone, S. & E. Helsper. 2007. "Gradations in Digital Inclusion: Children, Young People, and the Digital Divide." *New Media & Society*, 9(4): 671-696.

Livingstone, S. & P. Lunt. 2007. "Representing Citizens and Consumers in Media and Communications Regulation." *The ANNALS of the American Academy of Political and Social Science*, 61(1): 51-65.

Mehra B, C. Merkel & A. Bishop. 2004. "The Internet for Empowerment of Minority and Marginalized Users." *New Media and Society*, 6(6): 781-802.

Nahon, K. 2006. "Gaps and Bits: Conceptualizing Measurements for Digital Divide/s." *The Information Society*, 22: 269-278.

National Telecommunications and Information Administration. 2000. *Falling through the Net: Toward Digital Inclusion*. Washington, DC: U. S. Department of Commerce.

Norris, P. 2001. *The Digital Divide: Civic Engagement, Information Poverty & the Internet Worldwide*. Cambridge: Cambridge University Press.

Polat, R. 2005. The Internet and political participation: Exploring the explanatory links. *European Journal of Communication*, 20: 435-459.

Rice, R. 2002. "Primary Issues in Internet Use: Access, Civic and Community Involvement, and Social Interaction and Expression." Pp. 105-129 in *The Handbook of the New Media: the Social Shaping and Consequences of ICTs*, edited by L. Lievrouw & S. Livingstone. London: Sage Publications.

Rahim, S. A., L. Pawanteh & A. Salman. 2011. "Bridging the Ethnic Divide: Promoting Citizen Participation among the Young Generation through Information Technologies." Paper presented at the Atiner 9th International Conference on Communication and Mass Media. Athens 9-12 May 2011.

Shah, D. V., J. Cho, W. Eveland, Jr., & N. Kwak. 2005. "Information and Expression in a Digital Age: Modeling Internet Effects on Civic participation." *Communication Research*, 33: 531-565.

Sylvester, E. & A. McGlynn. 2010. "The Digital Divide, Political Participation, and Place." *Social Science Computer Review*, 28(1): 64-74.

Van Dijk, J & K. Hacker. 2003. "The Digital Divide as a Complex, Dynamic Phenomenon." *The Information Society*, 19(4): 315-326.

Van Dijk, J. 2005. *The Deepening Divide, Inequality in Information Society*. Thousand Oaks: Sage Publications.

Wellman, B., A. Quan-Haase, J. Witte & K. Hampton. 2002. "Capitalizing on the Internet: Social Contact, Civic Engagement, and Sense of Community." Pp. 436-455 in *The Internet in Everyday Life*, edited by B. Wellman & C. Haythornthwaite. Oxford, UK: Blackwell.

Wilson, E. J. III. 2006. "Why We Need a Negotiation Model to Explain Internet Diffusion." Paper presented at the Access to Knowledge Conference, Yale University, New Haven, CT, USA.