The Impact of the Digital Divide on Education and Health

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Abstract: *Digital divide, the gap between technology haves and haves-not, is rising in all areas where the use of computers is prominent. This gap gives rise to several related problems like poverty, unemployment, illiteracy, and fewer health benefits. This article examines the existence of digital divide and discusses its impact on life, education, and health. Digital divide in education is an acute problem as those with awareness of information and computing technologies (ICT) are reaping the benefits of online education and all available resources that not only improve productivity but makes information easily accessible. Digital divide in the health education is rising and people with access to ICT are getting all useful health information from the internet and improving the quality of life. The issue of health gives rise to double divide since economic and social disparities reinforced divide on those who can't afford to have computers or internet access.*

Keywords: *digital divide, health, information and computing technologies.*

1. Introduction

The term digital divide (DD) refers to the gap between those who have access to information and technology and those who do not. Since the use of computers is wide-spread and most of the information is available through the internet, not having access to computer means not being able to use the resources and information. Therefore, digital divide can also be seen in terms of difference in having or not having the opportunities to use and avail the resources, and recent developments. The difference in the opportunities between users and non-users of technology gives rise to one more issue of equity. Those with access of information and computing technologies (ICT) are the privileged people as they reap the benefit of technology. The non-users of ICT are lagging behind because they cannot reach the information and available resources. The digital equity can be seen between countries, gender, rural/urban areas. It is a general agreement among scholars that digital divide leads to several accumulated problems like poverty, illiteracy,

unemployment, which makes digital divide a very serious problem and it requires lots of work to overcome it. The main object to overcome digital divide aims at reducing digital inequity i.e. unequal distribution of online resources and technologies. Digital equity focuses on equal distribution of technologies and resources among whole population. The digital equity can be seen among equal access of Information and communication technologies (ICT) in gender, age, countries, and rural/urban places.

2. Understanding the Digital Divide

This section addresses various matters related with the digital divide.

2.1 Is digital divide a Serious Issue?

In recent years, the use of computer is becoming a necessity of life. All important information is available online. In today's world, citizens are expected to be able to use and work on the computer and if they are not capable of it, then that leads to many problems associated with it [1]. The online access improves productivity and efficiency as it requires minimum effort to look and search for the information online. The growth of ICT is in every area of life and computers are used for social, personal, and educational purposes. The growth of these developments has created opportunities for everybody to have convenient and easy access of information. In education, multicultural education is becoming popular and whole world is getting connected with the use of technology. The use of computers is enabling sharing of educational resources among different countries. Online education is also rapidly increasing as it allows its users to take courses online at their convenience. Using online resources, different countries is different educational settings are able to benefit from each others experience. While sitting in one corner of the world, an online users can access information from anywhere in the world. The computers are successful in connecting the world together. The

ICT allows immediate access to news in every corner of the world, communication is becoming fast, and use of email lets people share each others ideas even if they are at distance. Though these developments are helping society to stay connected and progress, those without ICT are lagging behind in every aspect. The digital divide is serious if it continues because it will lead to divide the world into two parts: users/non-users of ICT. Those who do have access to technology are lagging behind in many areas where access to technology is needed. For instance, applying for jobs that are available only online, getting information about available resources, searching for available product, booking tickets to go somewhere, to explore the opportunities available in certain area. This list is endless. People with access to the recent developments and internet are in a better position to avail all these resources and information and benefit from them. This gives rise to digital divide as an equity issue too. The recent report by world information society [2] has indicated that the gap is widening and hence, measures are needed to minimize the gap.

2.2 Where is digital divide?

The digital divide can be viewed in terms of difference in the access to ICT in gender, countries, educated/illiterate, and rural/ urban area. In countries, the use of computers is extensive in some countries than other. Like developed countries have more percentage of people with access of ICT compared to developed countries. Even in developed countries there are certain regions that are behind others in term of access to ICT. Dijk's article [3] reports how southern regions in Europe are having limited access to ICT compared to rest of Europe. Among developed and developing countries, there are many reasons for the unequal distribution of ICT. In developing countries, the government is still struggling to provide education, power, food, and home—the issue of digital divide is not focused. The priority is to give importance to basic needs to life that the issue to digital divide is not completely addressed. In order to have access to ICT, developing countries need resources, necessary infrastructure and money. The report on world information society points out the recent developments in bringing ICT to the developing countries. In rural setting, access to ICT is not prevalent as urban area. The reason for easy access to ICT in urban area is due to more educated people, having power access, and better awareness of the benefits of ICT. In rural areas, people get limited access to ICT due to less availability of computers, learning opportunities, less resources, and less usage learning facilities. Among gender, the use of ICT is more prevalent in males compared to female. In some regions, females have less ICT learning opportunities compared to males. Females are bound by society to provide the basic necessities of life like food, cleaning, child-care, and other household work that they get less time to explore ICT. In technical education study, the percentage of males is more than females. This leads under-privileged people to get further behind their peers in access of ICT or gives rise to so called the digital divide.

2.3 How to Overcome digital divide?

The digital divide could be due to many causes or multiple factors. In order to combat digital divide, there is a need to understand the factors that leads to digital divide. Dijk [3] argues that access to ICT is possible in four steps: motivational, material, skill, and usage access. The author points out that only by having physical access; it is not possible to have access to ICT.

Motivational access is the first access needed for ICT and is described as not having access to ICT due to negative psychology about using technology. This view leads people to have bad views and fears about using ICT. Some people think that ICT are not useful for them as it won't benefit them in any way. Some people have natural fears that something bad could come if they use ICT—using computers with personal information may lead to identity theft. For instance, some people don't want to use computer because they think that it will make their lives public or don't want to use computers because they are not convinced about the security of the information or data while working online. In some situations, some people want to hide their limited knowledge of computers and it makes them staying away from using the computers. Age, gender, and social culture are some of the factors that could cause motivational access. Motivational access leads to digital divide since it works against working on computers. To overcome motivational access, a positive and conducive environment is needed. This could be done by increasing awareness about benefits of using the computers and providing many opportunities for them to learn using the computers.

Material access is the next access that comes after motivational access. This means having physical access to computers. So, owning a computer or having access to computers comes in this category. This access is increasing these days as computers are available for people to work at public places, number of people that own a computer are increasing, and access to computers is also possible by paying a minimal amount (using cyber cafes to work on computers).

After having motivation to use computers and having physical access to computer, next access needed is skill access. The user should have the skills to work on the

computers. Skills access can be seen in terms of three categories: operational skills - knowing how to use internet for basic operations like working on internet, information skill - using computer to search for information on a particular area, and strategic skill - using computers for some specific purpose or goal. This includes knowledge of many computer software and programs. For instance, using computer to search for best books on calculus comes in skill access. Strategic skills require users to have net-working capabilities as well as knowledge of the area of interest.

Final access is usage skill that means using the computers. It comes after having motivation, physical access, and skills to use computers. Usage skill depends on many factors like usage time, usage application, Broadband (BB). Some people don't work on computers because of time limitation. Researchers argue about the increase in BB usage in recent years and use of BB in overcoming digital divide. The use of BB is more prevalent in areas than dial-up. BB allows users to have fast and easy access to ICT. It is further an debatable issue what role BB plays in reducing digital divide as some studies have pointed out that there are many household with BB access but ICT usage is very low or limited to certain members of the family. Users are not able to have access to ICT if any of these four accesses is missing.

Dijk [3] argues about the shifts in the strategies to overcome digital divide. The digital divide now is not about physical or material access but it is about skill and usage access. Author points out four types of access: motivational, material, skill, and usage and then emphasizes that though material access is closing, skill access is growing. So, the problem is not about having a computer but about using it. The strategies for overcome digital divide could be at large scale (all-over the countries) or small scale (directed towards a region). The article on digital divide in Africa refers to large scale strategy for digital divide that was focused on several countries on Java revolution whereas the article on digital divide in India focuses on the importance of small successful samples to successfully conquer digital divide. The small sample study show how to see if a certain approach might be successful in overcoming digital divide.

Some of the strategies that could stimulate ICT growth include - regulations by the government, market reforms, basic infrastructure, conducive environment for investment, and highly skilled labor. I think that all of these play a vital role in ICT growth and which strategy would be more effective than other varies from one region to other. Like when we see disparity in network assess from urban to rural area, government could be the one that plays most important role. By having rules and regulations this disparity could be minimized. I believe that in other strategies too like in basic infrastructure and market reforms, government plays an important role.

3.   ICT and Education

The use of technology in education has increased in the last decade. Useful information and resources that could help learning are easily available on internet. For instance, the online availability of library resources makes learning possible at home. The articles, books, and resources are available for use, without physically going to the library. This not only saves time but also motivates users for education. This online availability of information helps both teachers and students. The teachers can find out about all useful books on any topic, look at the syllabus of other faculties teaching similar courses and use their inputs, design a lesson plan based on vastly available materials. Students can look for any kind of information on internet that could help them in clearing their doubt, use online available books and articles to sharpen their understanding of a subject, take part in online forums and discusses to broaden their understanding of a concept. The communication between faculty and student is also fast because of internet. The research also supports that technology could support teaching and learning ([4], [5]).

Some of the barriers in using ICT in teaching and learning are: lack of computing equipment, lack of institutional support, disbelief of technology values and benefits, lack of personal confidence in technology, and lack of time. Disbelief in technology values and benefits and lack of personal confidence in technology, can be grouped together in terms of motivational access. If the teacher does not want to use technology in the instruction this leads to digital divide. Also, the availability of technical equipment and facilities does not ensure that teachers' are going to use it if they lack personal confidence in the technology. To overcome these barriers a proper training for using technology should be given to the faculty. These two factors can be classified as internal factors that cause barrier to use technology in education. Lack of computing equipment and lack of institutional support can be classified as external factors leading to digital divide. Sometimes even if faculty wants to introduce the technology in instruction because of lack of computing equipment it is not possible. Sometimes there is not enough support for faculty to use technology in education. The supporters of traditional approach to instruction still focus on having instruction using chalk and board instead of using computers. The face-to-face instruction has

limitation of having access by only those who can physically attend the class. The online instruction does not require person to be physically present, so you can learn at home too. Those who are far away (in different country), can also benefit from online education. The flexibility is one of the advantages of having online instruction as the person can take the lecture at per convenience.

3.1 The Role of the Teachers

Teachers play an important role in the use of ICT in education. If teachers motivate their students to use computers in the class and base their instruction that promotes using ICT, they could facilitate the use of computers among their students. There is a general agreement among researchers that use of ICT in education could benefit from teachers who are proficient in it. Some factors that have impact on teachers use of ICT are: lack of computing equipment, lack of institutional support, disbelief of technology values and benefits, lack of personal confidence in technology, and lack of time. Researchers have indicated that lack of institutional support and lack of time are factors that impact the use of ICT [6]. Salinas ([7]) pointed about the role of the teachers in rural areas. Author argues that teachers' are the gatekeeper in rural areas. The use of computers in rural area is depended on teachers' willingness and knowledge of computers. This study further reflects the importance of training teachers to use ICT so that they could incorporate technology in the education.

Hence, there is digital divide and it hampers the growth of under-privileged people. Some work is done to overcome digital divide but still more needs to be done.

4.   The Digital Divide in Health

Professionals and general public use internet to seek important health related information. Internet not only allows easy and fast access, it is also inexpensive. eHealth refers to the healthcare practices that are supported by electronic resources and communication. Online health clinics are getting popularities these days. The issue of health gives rise to double divide since economic and social disparities reinforced divide on those who can't afford to have computers or internet access. Specifically, eHealth literacy was defined as "the ability to seek, find, understand, and appraise health information from electronic sources and apply the knowledge gained to addressing or solving a health problem" ([8]).

The use of online resources in healthcare is popular in:

a) Electronic health records. This allows digital storage of health information which enables easy and fast exchange of health information between patients, healthcare professionals, and pharmacists.

b) Telemedicine. This refers to online use of patients' relevant information without any need to travel physically. It makes it possible for specialists to look at patients' information using online tools. This includes looking at patients data online or as simple as discussing a case on phone with other medical professional.

c) Health knowledge management. Resources that facilitate health literacy including many physicians' resources like Medscape.

d) mHealth. Using mobile services to collect patient's health data.

e) Virtual healthcare teams. This consists of groups of healthcare professionals who collaborate and share health services using online tools.

f) Healthcare information system. Some of the things that come in this are: online appointment scheduling, doctor's schedule, and looking at pharmacy open hours.

4.1 Factors Affecting the Use of Internet for Health Purposes

Renarchy et al. ([9]) have pointed out that use of internet for health purposes is very limited for primary prevention mostly it is used for secondary prevention as a tool to enhance understanding of a health issue. In the study, authors conducted a survey in Paris metropolitan area in 2005 to find out the relation between access to internet and use of internet for health purposes. Many researchers have claimed the association of age, education level, ethnicity, and income level with the use of online health services. Generally, young people are inclined towards using internet. White and rich people are using more online health services compared to other races and poor. Mostly educated people are the one who use internet for various purposes including health. Renarchy et al. find out that among age, educational level, race, and income level, educational level was the most significant variable that influences the use of computers for health purposes. Women were more inclined to search for health information using internet than men. This could be because women are considered as care taker in the family and they take the responsibility of looking after in case of sickness in the family. Renarchy et al. found a new dimension that influences the use—social isolation. Those who are not well connected with the society are less likely to use computers. This could be related to the fact that most of the times people search for health information related to someone close to them in family/friends. Use of internet was prevalent in Paris metropolitan than nationally. Socio-economic characteristics that lead to less use of

internet are: low income, no education, social isolation, unemployed, and foreign nationality.

Health literacy of individuals is closely related with their education level. Several studies examined the relation of education and health literacy and concluded that the health literacy was higher in those who are well educated as they were able to understand, comprehend, and follow the direction to attain health. Taking medical doses as directed by the physician or taking over-dose is also related with individual's education level. Internet serves the purpose of disseminating health information and could help in developing better understanding of health related issues. Health awareness affects individual decision of going for preventive health care decisions like: regular medical check-ups, pap-smears, and having awareness of symptoms and consequences of deadly diseases like AIDS. Health literacy promotes one's understanding to better health and internet is one of the medium that provides health information and those who could not reach this information, are at disadvantaged condition. Health literacy is also related with race, socio-economic status (SES), and age. Researchers have shown that chronic diseases are prevalent in minority population. Also, population from low SES is more affected by deadly diseases and this could trace back to not having access to all health care facilities. Internet provides health literacy and using internet people from low SES could reach health information available at low cost.

4.2 Integrative Model of E-health

Bodie and Dutta ([10]) gave Integrative model of ehealth that provides a deeper insight to understand eHealth. Model depicts how micro issues combine together and result is a macro issue. To promote eHealth, there is a need focus on the inner issues that impede eHealth. Model suggests one of the micro issues is motivation. If users have no motivation to look online and search for the related information, there is no way he/she will use internet for health purposes. Model connects eHealth literacy with computer literacy and health literacy and points out importance of both for eHealth. For instance, if someone has some knowledge about some health issue and wants to further explore the possibilities using internet, both health literacy and computer literacy are needed. Using computer literacy that user will search for the specific information and using health literacy user will be able to discard irrelevant information and will be able to judge the credibility of given information.

This model also emphasizes four aspects that are needed to engage successfully on internet for eHealth. The first aspect is the ability to obtain information and have motivation to do it. This needs basic knowledge to search for the information on internet and have some

inspiration to do it. The second aspect is to understand and rate the quality of given online information. This requires some basic understanding of the knowledge users are looking for that enables them to decide whether to discard it or take it seriously. Since online information is not always coming from a health care professional, it is must to be able to judge the significance of given information. The third aspect is to have competence and confidence to utilize the health information. If the users are health literate, they are able to comprehend and use the information in appropriate ways. And final aspect is to use all three above in an appropriate way, to have positive impact on health and well-being. All these steps occur when user uses online information for health purposes.

4.3 Credibility of Health Information Online

The issue of digital divide in eHealth is not limited to resources and software. Even those with these are not convinced to use internet for health. I believe that issue of health is very personal and the use of internet and relying on the information varies from person to person and also it's different in different contexts. Researchers have indicated that the information on internet is generally coming from those who are not professional in this field and hence how good it is requires personal judgment. Since the seekers and providers of internet information are increasing, it is important to understand the credibility of online health information. This is more important as when health information is provided online it is difficult to find out: (a) who authored the document, (b) when was it updated, and (c) how reliable it is.

Since the use of online health information is very much dependent on how much credibility users have in it, it is important to understand the issue of credibility of online information. Some researchers have concluded that perceived credibility of online information is same as information on television and radio but newspapers are perceived to be most credible than online resource of information. Institutional sites are perceived as more credible compared to individual sites. Eastin ([11]) studied the relationship topic knowledge, source expertise, and apparent credibility of online health information. One-hundred and twenty five students from a northwestern university participated in the study. The participants were randomly divided into two groups and were instructed to look at the selected websites that contain information about and unknown disease and a known disease like HIV. Participants were asked to assess the credibility of websites using different measures. Results indicate that source of the information plays an important role in credibility. If the information is coming from a highly credible source, it was viewed as credible. Knowledge of content was a significant factor in deciding the credibility of

information. If users had knowledge about the content, they viewed the information as credible compared to the content about which users had no idea.

4.4 Myths About Digital Divide in Health

[11] Stellefson et al. ([12]) examined the myths about digital divide in health. They argued that the use of internet for health purposes has increased over past years. Educated people are more inclined to use internet for health purposes. Health websites on internet are serving their own purpose of having more and more customers instead of being there for common welfare. Commercial websites are often used compared to scholarly websites for health literacy. Some of the issues in eHealth are:

(a) Accessibility. One of the major factors that affect use of internet for health purposes is accessibility. Interoperable, knowledge based network like National Health Information Institute (NHII) provides reliable health information online. This type of interdisciplinary partnership allows promotes health information at low cost to users. Health educators need to come up with this kind of interdisciplinary collaboration that facilitates health literacy.

(b) Enabling eHealth. Health educators need to reap the benefits of technology to increase health awareness in the public. Some researchers have argued that the use of technology is more effective if it is coupled with entertainment. How technology could be used to increase health awareness is still not completely known. There is a need to provide a conducive environment online that promotes the usability of internet for health.

(c) Consumer health informatics. This is a new field that aims at analyzing consumer's health needs and implementing/providing consumer health information. This field is emerging and it is not possible to judge how effective it would be. There is a need for collaboration in fields like informatics and health education that makes health information available without fragmentation in different parts.

5.   Conclusion

The future of education and health lies is reaping technological benefits. The digital divide in education and health is a serious issue as it impacts the quality of life one could have. A lot needs to be done in the area of overcoming digital divide especially in health. In the twenty-first century, we envision a society that uses technology for all those purposes that promotes health and improves quality of life. These envision allow us to have a society free from digital divide.

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