



The Digital Communications Revolution

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Abstract

We are living at the crest of a communications revolution. Digital communications and computers are having a tremendous impact on the world today. This article studies different aspects of communication systems by covering some basic ideas, approaches, and methodologies and gauges the degree of the current state of digital communication studies together with its research into mass communication. This article explains the rationale for the digitization and analyses the new ways of producing communication, the characteristics of digital communication products and the consumption processes that they activate. Finally, an analysis is done of the methodology and technology used in the creation of the multimedia version of the exhibition, and the complexities of the fields of knowledge that are fundamental for constructing a Theory of Digital Communication (TDC).

Digitization is creating a second economy that's vast, automatic, and invisible—thereby bringing the biggest change since the Industrial Revolution. This article concludes with a Theory of Digital Communication that should resolve, from defining the study aims and the most pertinent methodologies with the closest fields of knowledge with which to establish strong epistemological relationships. Can such a transformation—deep and slow and silent—be happening today?

Keywords: digital communication, mass communication, new media, hypermedia, interactions, theory.



1. Introduction

In conventional parlance, the current era in history is generally characterized as one of globalization, technological revolution, and democratization. In all three of these areas, media and communication play a central, perhaps even a defining, role. Economic and cultural globalization arguably would be impossible without a global commercial media system to promote global markets and to encourage consumer values. The very essence of the technological revolution is the radical development in digital communication and computing. The digital communications revolution may have begun in 1832 with the Morse telegraph, but it is still a significant movement. It should be realized that digital innovations and increasing transmission efficiencies are simply picking up speed with age. The Gutenberg era is over. A new digital communications technology has emerged. An electronic superhighway is beginning to girdle the globe as voice; video and data converge, bringing in their wake a new basket of digital, multimedia and interactive communication technologies. The world's media, telecommunications and information technology industries are undergoing a period of unprecedented and profound change. Dramatic technological advances combined with market liberalisation and globalization have together engendered the .digital revolution. A dramatic consequence of this is convergence, a ubiquitous but loosely defined term commonly understood to denote the blurring of boundaries between the media, telecoms and information technology sectors. There is broad consensus between academics and practitioners that technological advances are bringing these sectors closer together and have the potential to transform them entirely. It is because netification, computerization, and digitalization all increase choices.

In days of yore, if you wanted to rise to the top of the social stratosphere, all you needed was good penmanship and a horse to ride to on house calls. But alas, times have changed, and the world of socialization is so much more confusing. Horses have been replaced with tweeting birds (which, when malfunctioning, are substituted for a single whale), and penmanship has been replaced by finger-tapping (and a resignation to the tyranny of autocorrect). Now we live in a time where the mainstream has fallen behind the zeitgeist and the world has become so wired together, so flattened that you can't avoid seeing just where you stand on the planet—just where the caravan is and just how far ahead or behind you are. The main reason for today's flattened planet, of course, is the internet. Within last 30 years, the emergence of Internet as a media delivery system has transformed the structure and the economics of the



media business throughout the world. The tremendous acceleration towards convergence of communication and internet is bringing the advancement of digital communication to its extreme capacity. Convergence does not necessarily sound the death knell of age-old technologies. In fact, it leaves enough room for many technologies to co-exist and one will not replace the other outright. This is because no one technology can meet all the requirements of the market-place. Hence, each technology will find its niche and redefine new and old classes of service and user terminals. In this context one can safely assume that there will be a rash of new user terminals that will let us communicate in ways we dream.

In India the convergence has arrived faster than expected. The convergence would help in web casting, video on demand, and internet via cable. The much awaited delivery of Internet through cable network has already started in Delhi and Mumbai. The 'convergence' of technologies has given birth to the prospect of multimedia services which will offer interactive computer based applications that will combine text, graphics, audio and animation features into a media experience for users. India, like any other developing country, has always been very responsive to the latest developments in the media and the Indian government has implemented various development plans as well as promoting human development, especially in today's environment of social and economic change. India has also been particularly attentive to the rapidly changing world of information and communication technology but at the same time is mindful of the effects of the information gap or the digital divide in the Indian society.

2. Definition of Digital Communication

Definition (According to the "Digital Citizenship"

website [<http://coe.k-state.edu/digitalcitizenship/index.htm%5D%29%7C>]

Digital communication: electronic exchange of information. One of the significant changes with the digital revolution is a person's ability to communicate with other people. In the 19th century, forms of communication were limited. In the 21st century, forms of communication have exploded to offer a wide variety of choices (e.g., e-mail, cellular phones, instant messaging) The expanding digital communication options has changed everything because people are able to keep in constant communication with anyone else. Anyone is afforded the opportunity to access information anywhere and anytime. Unfortunately, many



administrators, teachers, students, and the general public have not been taught how to make appropriate decisions when faced so many different digital communication options.

3. Digital Communication Revolution

Today, the digital communications revolution is also changing the social landscape, with the power to free millions of people from the marginalization that comes from having no voice in global affairs. Power now rests with the people – and people now expect to be heard as a right. The world's media, telecommunications and information technology industries are undergoing a period of profound change. A cocktail of closely interrelated developments including the exponential growth of the internet and World Wide Web, digitisation, dramatic reductions in the cost of computing power, deregulation and market de-regulation has triggered the so-called .digital revolution. For sometime, scholars, educators, policymakers and parents have been debating the implications of media and digital technology for literacy, attention span, social tolerance, and propensity for aggression, among other concerns. This communications tsunami is rolling our way and many of us are not sure what to do. We see the tide going out fast and far. But standing on the beach and waiting for it to roar back in is not an option.

Now digital communications is a field, which has overpowered all the communication and the media fields. Digital communication, as the word itself explains, takes the use of digital methodologies to communicate digitally or technically. Today, we have more ways to communicate something that would have been unthinkable for previous generations. Everybody is communicating from various multimedia tools like podcast, newscast, YouTube and other multimedia tools. This is how multimedia benefit from the use of communication technology.

Digital communications techniques and devices have been around for ages. The 1980's popularization of the computer and the birth of the Internet was a quantum shift in communication and an evolutionary step for human society. The Digital Revolution marked the latest stage of the information age. People in distant parts of the world now connect instantly and information flow has shrunk the world. One of the biggest changes recently is the interconnected immediacy of social networking. Digital communication systems are ubiquitous in the modern world and comprise some of the most important technologies of



21st-century society. Information and media literacy involves the ability to critically analyze and evaluate information; determine what information is needed; and locate, synthesize, evaluate, and use information effectively (Gunter, 2007; NCREL & the Metiri Group, 2003). Since so much of today's media is in visual form, students need visual literacy skills to understand information that integrates images, video, sequences, design, form, symbols, color, 3D, and graphic representations. They need to know how to interpret visual messages and look beyond the surface to determine deeper meaning in what they see.

The rapid development of digital technologies has radically transformed ways of keeping in touch with home cultures and diasporic networks. In each stage of technological development, particularly within communication technology, there is a grander impact upon cultural relationships that spreads across multiple disciplines – social, economical and political. Within this relationship between these cultural characteristics it is often hard to establish the sequence of their occurrence, or if they indeed occur simultaneously. When considering this, the Andy Warhol quote “the perineal [cultural] question: Does art imitate life, or does life imitate art?” (Irwin and Gracia 2006) has much relevance to the temporal relationship to the technology coming first, or if the cultural need or desire is present to inform the development of this technology. The same could certainly be said about the impact that this type of technological development relationship has politically and ultimately culturally. This poses the question, does the communication technology come first, or does a change in the political state occur to instigate the transformation of these communication technologies and their techniques? Moreover, the notion of migration has undergone significant shifts, coming to signify imaginaries on the move which are not necessarily linked to geographical displacement. ‘The rise of digital communications and widespread access to telecommunications and cables networks has a profound impact on virtually every aspect of contemporary life. Society currently heavily relies on such digital equipment like cell phones, desk computers, laptops, digital cameras, televisions, DVD players, blue ray players, gaming systems, and digital music players. All of these devices can be used in conjunction with one another and communicate to one another seamlessly. From advanced wireless multimedia systems to simple integrated home networking, communications and networking technologies are at the center of a continuing revolution. In addition to changing our daily



lives, the transformation in digital communications also raises important economic, public policy and societal questions.

The first signs were the rise of online journalism, where bloggers and crowd-sourcers worked to fill the slack of mainstream media, much of which has been controlled through moneyed interests. Many media entrepreneurs are now imbibing the online edition culture side by side with hard copy versions. They do this in anticipation of the waxing strength of digital communication, especially to conquer the fear that its full emergence would kill the traditional media. They also train back up- capacity building; there is issue of robustness and freshness of content etc and doing it with panache. To them, digital journalism has become a new cash cow. In addition, the popularity of social websites like twitter and You Tube has contributed to the eventual decline of many traditional newspapers and TV news. The new digital press is more and more running roughshod over the old printing press, it is gradually replacing much of the existing system of journalism which often filtered and slanted perception toward particular commercial interests.

The internet is direct democracy and there's no hierarchy and everyone can express themselves. Although inequality of access to this technology is a problem, the Internet has opened the door to an incredibly fast changing and relatively unmediated world. The Internet is borderless. It can take one to virtually any corner of any street. The world has become literally a click away. People who go online can have direct communication with those in other countries through social networking on platforms such as Facebook and Internet Relay Chat. This relates a person immediately to events happening around the world and to masses of like-minded people.

The first ones to pioneer WikiLeaks on the web were hackers and programmers. They have blazed through a wild cyberspace, not bound in the same way by the laws and traditions of society. Through the wild currents of net-neutrality, the fresh thoughts and ideas of people that are exiled from the mainstream find refuge in offshore digital asylums. In this domain, one can explore and carve out a different identity. In relative anonymity, one with technical savvy can connect, travel and embody wishes and ideals via digitized avatars and move freely beyond prescribed societal roles. Despite increasing Internet surveillance and censorship, many still feel safer finding like-minded people online to share their grievances toward



government than through traditional structures. WikiLeaks put its roots down on this new neutral infrastructure as the first stateless whistle-blower publisher that exists only on the internet. By revealing government and corporate abuse, this organization has inspired people world over to unite in a struggle for justice.

Recently, unions have lost power and become mostly window dressing for corporate structures and a prop for this semblance of democracy. After having so much of their power stripped away, Unions are joining the protesters and bypassing the traditional political system. It is a new form of sit-in. Through encampment, people are starting to learn to live together, creating an alternative society. Leaderless movements encourage each person to become their own leader and really work with others. Decentralization means power is rendered by the people back into the hands of the individual.

The rise of digital media has fundamentally changed the complex relationships between brands and consumers. Media business is taking a new shape globally. Digital communication is the in-thing now, and media entrepreneurs with foresight are not sleeping. Owners of these media organisations do this in anticipation of the waxing strength of digital communication, especially to conquer the fear that its full emergence would kill the traditional media. Advertising was never a goal unto itself. Our real role has always been creating competitive advantage for the brand and product through any means available. This has traditionally meant creating differentiation for products and brands through creativity and innovation in how we positioned and told stories around those products and communicated their benefits. At it's most blunt, it's meant using reach and frequency to blast familiarity into peoples' brains with catchy slogans and jingles. And so from this starting point it makes sense that we tend to focus on what we can achieve in digital through the lens of communication alone. And while the latest digital technology offers potential for unprecedented levels of consumer engagement, it also requires our industry to adapt rapidly in order to exploit the opportunity successfully.

With the surge in popularity of digital communication comes a requirement for everyone to use their literacy skills across a rapidly expanding range of contexts. Children growing up in the digital age are very motivated by the possibilities of ICT .A myriad of innovative new media organizations have sprung up to take advantage of the opportunities that stem from



low-cost distribution networks. Over the last few years, the field of professional communication has experienced a significant change: digital communication has become one of the fastest growing and innovative sectors, with companies, NGOs and organisations adopting digital tools on an increasingly large scale. The mushroom-like growth of new media technologies is radically challenging traditional media outlets. In the face of such seismic shifts and ruptures, the theoretical and pedagogical foundations of film and TV studies are being shaken to their core. New Media demands a necessary rethinking of the field. Modern world is dependent on digital communications and a new culture has emerged, changing the way people exchange information. In the media industry, the former frontiers between content producer, content bundler, content aggregator, distribution platforms and home-based applications no longer exist. Everybody is now eating everybody's lunch, and digitalisation has made many business models obsolete. Players wanting to stay in business must adapt to the new environment and deliver added value to the final customer by offering increasingly attractive products in a cost-effective way. They have to forge strong customer ties and use data and algorithms efficiently to compete against the pure Internet players.

Today, thanks to new technologies and the digital communications revolution, educational experiences and information are available to anyone with an Internet connection and a computer or mobile device. These new technologies are transforming how we create, obtain, use and share knowledge. As well, they are taking the power of knowledge to new heights. By making knowledge widely accessible, new communications vehicles have created an unprecedented global platform for innovation and ideas. Via the Web, innumerable bridges are being built, linking “day-to-day” life to “university” life. People from all over the world are connecting and contributing to our shared intellectual heritage like never before. With the tools now at our disposal, we all have the opportunity to define and shape the kind of global society we want to live in. It has been expected for some years now that the communication technology of the Internet, and the accompanying development of digital repositories and free electronic journals, should cause a digital revolution in scholarly communication digital revolution in scholarly communication which would ease the scholarly communication crisis. Since 1998 there has been widespread advocacy of a new electronic paradigm of scholarly communication via *free electronic journals*, meaning those which are accessible via the Internet, with no gates, tolls or registration. But the much awaited revolution has not yet come.



4. Theory of Digital Communication (TDC)

Communication and information theory are the theories of modern digital communication systems, where "digital" means that we are transmitting information as symbols (or numbers) from a finite alphabet (or limited set of numbers). Although physical signals are continuous waveforms in time, the principles of communication theory, allows us to consider the continuous waveforms we are transmitting and receiving over a noisy and interfering communication channel (a telephone cable or the radio waves propagation of a mobile phone antenna) as a digital system, randomly perturbing the information that we are transmitting.

Newspapers and magazines dominated the media in the second decade of the 20th century. Tabloid or "jazz journalism", defined by its sensationalistic approach and emphasis on scandal to sell newspapers, along with radio furthered the spread of media in America. The diffusion of broadcasting in the second decade of the 20th century was followed by the development of a theoretical corpus about 'new media' such as radio and, thirty years later, television. At that time a large number of readers and anthologies examined the new technological situation from a wide range of epistemological and theoretical angles. As a whole, new media studies are characterized by an exceptional openness towards theory and method and up until now it seemed impossible to discern any obvious canon guiding research decisions in the field. This 'experimental approach towards theory and epistemology' (Sterne, 1999: 264) allows for valuable interdisciplinary cross-fertilizations that hold the promise of a better understanding of evolving technological and social situations. Drawing on critical theory, three meta-theoretical criteria concerning power, reason and closure are suggested and applied in a review of common theoretical perspectives at use in the field. However, it does not seem that the prevalence of this experimental approach in new media studies can be ascribed to any larger meta-theoretical decision or discussion. While there certainly is some overlap with the epistemological discussions of cultural studies and other academic traditions, much of the field's experimental character seems to be attributable to enthusiasm in the face of the experimental possibilities of the new technologies themselves

Evolution is natural to the technology business. Taking Digital Media to the Next Generation is no longer based on the broadcasting logic and has changed the limits and habitants of this territory: Digital visual information processing and communication pervade nearly every aspect of our daily experience, and have even invaded our pockets in the form of camera-

equipped cell phones, PDAs and epistemological spaces. Considering the quick progress of technological and financial consolidation in the new media sphere, these technologies' experimental possibilities may not persist very much longer. In a climate that is generally more hostile towards such characteristics, the need for an 'experimental approach' in academia also would appear less self-evident. The risk that new media studies' valuable openness and social relevance will be compromised in such a scenario, therefore, has to be countered by the development of a more explicit meta-theoretical corpus. However, along with the maturing of the field, histories of the field (Silver, 2000) as well as topical, theoretical and methodological meta-analyses have been developed (Kim and Weaver, 2002; Silver, 2004; Stempel and Stewart, 2000), pointing towards a need for more conceptual comparisons and evaluative analyses of the underlying theoretical approaches employed in the field. The question is: What will be the operating system of next generation digital media and who will support it, and can an active "ecosystem" be maintained that enables technology companies to develop smart applications for it?

5. Digital or Hypermedia Communication

The advent of hypermedia space constitutes a qualitative leap in the ways that people seek, access, produce, and react to information. Two applications were described for hypermedia (Berk, & Devlin, 1991). First, they may serve as a thinking tool, to organize and facilitate access to personal and known information; second it can be a medium by which the user access information organized by others. The necessity to develop adaptative interface is relevant mostly in the second type, because then the user is confronted to a vast set of documents of which the structure and content is unknown. In this context, the function of the hypermedia is to communicate, making the information accessible and useful to the user. To understand the difference between presenting an information and making it accessible, it is interesting to think of the interface as a dialog, where the information is exchanged in both directions, where meta-communication and non-verbal cues serve as non-intrusive feedback to guide the exchange, finally where the information is gradually adapted to the level of competence and interest of the interlocutor.

Paradoxically, adding intelligence and control in the interface is contrary to the philosophy of hypermedia which is supposed to give the user full control to explore the content at a given moment. More so, an adaptative interface may be perceived by the user as unpredictable and



incoherent, increasing his impression of disorientation. Therefore, it is important to design the adaptation to make it both predictable and flexible to the user.

Most importantly, hypermedia space broadens access to the means of communication, since it is obviously easier for average people to “produce” messages today in the era of mobile devices and blogs than it was in the days of state-owned broadcasting, telephone landlines, and the daily newspaper delivered to the door or purchased at the store. The new media environment is therefore more participatory and network interactive communication systems based on hypermedia produce a type of cultural product that is not read linearly; rather, it is organized in a structure that is oriented towards connecting and integrating different pieces of knowledge. They are different from approaches in which authorship and management are centralized, as they develop processes of communication in which people participate, in which the communicative materials can be “experienced.” These systems bring culture closer to what we might call the “open-ended” approach. As interactive hypermedia systems take an increasingly prevalent role in the workplace, at home and on the web, their usability becomes vitally important to meeting the expectations of users and fulfilling the promise integrating technology into daily life. *Quality and Communicability for Interactive Hypermedia Concepts and Practices for Design* explores ways to overcome obstacles to successful communication from theories of communicability to the various levels of design and integration.

Analog signals are extremely susceptible to interface and corruption from noise, aging and corruption during copying much more than the digital media. The term “digital” seems limited when defining the new types of ‘interactive’, ‘multimedia’ or ‘networked’ communication because we can say that now, at the beginning of the 21st century, *all communication is digital* to a certain degree. How will digital technologies change our culture in the years to come? In what ways will they shape how we read and learn what we read and learn, even *if* we read and learn?. Interactive media is the integration of digital media including combinations of electronic text, graphics, moving images, and sound, into a structured digital computerised environment that allows people to interact with the data for appropriate purposes. The digital environment can include the Internet, telecoms and interactive digital television. As it is not restricted by time and space, the development of multimedia technology has facilitated direct contacts with customers and made processing



and applications of content easy, thereby accelerating the social diffusion of multimedia content.

Today media literacy has matured to a greater understanding of its potential, not just as a new kind of "literacy" but more, as the engine for transforming the very nature of learning in a global multimedia environment. After the invention of the printing press, it is the advent of multimedia that has changed the way we learn and comprehend. Now is the time to make media literacy education a national priority in advancing 21st century skills for a 21st century world. Integration of multiple media such as visual imagery, text, audio, video, graphics and animation together multiply the impact of the message. Multimedia differs fundamentally from the conventional media like slides and films. While, conventional media are linear (one event follows another in a sequence), multimedia is non-linear - it has the capacity for branching in different directions and establishing linkages between different sections or components of the programme. The non-linear attribute provides the end-user the luxury of viewing the multimedia presentation at their convenience and pace.

New computer media, including multi-modal media, hypermedia, voice-into-text concurrent interaction, and virtual reality, appear to have characteristics that may make them even more distinctive. Multi-modal computer media should increase the bandwidth and, to a somewhat lesser extent, the dynamism associated with correspondence and publishing media, thus extending the possibilities associated with these media in the direction of both film and art media and television. Hypermedia should have a similar effect in increasing the dynamism and, to a lesser extent, the bandwidth, of these same media, thus pulling these clusters in the direction of television and telephone media. Voice-into-text concurrent interaction should increase the dynamism and, to a lesser extent, the bandwidth and audience sizes associated with telephone and correspondence media, thus stretching these clusters in the direction of face to face interactive media. Finally, the high bandwidth and dynamism associated with virtual reality promise to stretch the limits of face to face interaction and create a new cluster of interactive mass media in the empty space above face to face interaction. Thus, in the wake of the advent of hypermedia, orthographers called for a reassessment of definitions suggesting that the digital era is in some respects reminiscent of the pre-literate era, for the storage, preservation and dissemination of knowledge “depends no longer on the actual process of writing. Current hypermedia systems can best be defined as an amalgamation of



hypertext and multimedia. While the hypertext data model enables this goal that is not true for the data models of other media forms. In the same way, the concept of 'hypermedia' also redefines the relationship between semiotics and mass communication theories. Finally, a yet to be developed TDC should be able to exchange concepts and hypotheses with a still in construction the labyrinth as a model of complexity: The semiotics of hypermedia.

Writing the Future

It is assumed that the future trends in digital communication will continue to be important and digital literacy will continue to develop distinct registers. Nothing could be more obvious than the ways in which writing is changing. We only have to look around us at the ubiquity of text messaging, the increasing dependence on e-mail as a form of communication and the reach of web-based information and entertainment. The future of writing is closely interwoven with the future of digital technology. In fact, when we look at current trends, four tendencies seem to be emerging. These could be characterised as convergence, portability, pervasiveness and transparency. Convergence refers to the capacity to integrate technological functions in a single device. Hence, the mobile phone doubles up as camera, MP3 player and so on – or the home media system deals with music, TV, telephonics and e-mail. The general direction of convergence is to allow for access to multiple media from a single source. Convergence pairs up with portability, because as devices become more compact and wireless connection becomes more affordable and more ubiquitous, the possibilities of being able to use all media, more or less at any time or place, increase. Pervasiveness suggests that digital technologies will feature in more and more areas of everyday life, becoming even more closely interwoven with the way we get things done. As this pervasiveness increases, it is also likely that technological innovation will focus on making devices and their interfaces more transparent – in ways that touch screens and desktop icons begin to suggest.

The spheres of telecommunications and broadcasting are rapidly evolving and converging into a single world of communication. Navigating convergence, portability, pervasiveness and transparency represent future trends and suggest that the devices we use to communicate with may well take on new forms and incorporate new functions. Yet, although the ability to combine and access media is likely to become much easier (and much faster) there is little to indicate major changes that will threaten the centrality of written communication. In fact it seems likely that digital literacy will become more significant and that the current tendency



for it to develop distinct registers (such as those used in discussion board posts, instant messaging, texting and so on) will continue. Building a flexible and intelligent educational response to digital literacy then becomes important both from the point of view of valuing children's everyday digital experience and in terms of preparing them for the future.

This relatively brief exploration of digital communication raises some fundamental questions about how we conceptualise literacy and literacy pedagogy. It challenges existing models and definitions of what constitutes text and what it means to be a reader, confounding recent attempts to simplify or reduce literacy to a set of basic skills and routines. Because of the disruptive nature of digital literacy, debates such as these are likely to continue. But in the meantime, researchers and educators would be well advised to begin to address these new literacies.

We need a broader agreement about what we mean by digital literacy and place written and symbolic representation. This will enable us to be more specific about the emergence of new forms of synchronous and asynchronous communication, the changing nature of literacy and the skills, understandings and attitudes that we will need to encourage in our schools. We need innovative work in digital literacy in educational settings particularly to investigate the implications of new forms of social networking, knowledge sharing and knowledge building. And finally, because of the pervasive nature of digital technology, the commercial interest that is invested in it and the largely unregulated content of Internet based sources, we also need to begin to sketch out what a critical digital literacy might look like. There is, in short, plenty to be done if we are to prepare children and young people to play an active and critical part in the digital future.

6. Conclusion

Digital communication used to be limited only to people knowledgeable about it. It has now become a part of daily life. More user-friendly programs have been developed. The price has also become more reasonable such that users now have more chances to use them. As a result, users' skills have tremendously improved as well. In the 1990s, only trained experts used graphic



design programs but now, many ordinary users are knowledgeable about it because of availability of information from technical books and the Internet. They can also receive feedback from other users through the sharing of information on the Internet.

Professional education on graphic design programs is no longer a requirement to execute graphic design. However, many are dependent only on private lessons while the average age of the users continues to go down, meaning that young people are already into graphic design. Further studies need to be undertaken for users who want to be more competent in using the more complicated programs.

While it is still not entirely apparent how the thinking of digital natives is changing, new technologies, when presented to teacher candidates in the context of their intended use, which is to enhance the teaching and learning processes, seem to motivate, engage, and offer more opportunities for self-directed learning and reflection. Such technologies provide avenues for creativity and foster inclusion of 21st-century skills in teacher education curricula. When the technology is already familiar and we employ these tools to challenge students to use critical skills, we reap the benefits of teaching today's students in their familiar spaces.

However, the development growth model is shaped like a snail shell, and digital technologies have not been the silver bullet that promoted the leapfrogging of creativity in stagnating countries. Information and communication technologies (ICT) should be considered as a means of technological learning rather than the end of creativity development. The challenge of strengthening stagnating Asian countries to become competitive and innovative nations will continue until the next decade. Unless necessary steps are taken to improve technological learning and local innovations in stagnating countries, their technological dependency will increase and thus deepen the marginalization in the coming eras.

In addition, training programs must be made available to non-users to help them gain knowledge on graphic design. This will prevent them from being alienated in the digital world. This can be regarded as a good government policy especially for a society that now has more senior citizens. Eventually, the average age of new learners will go down. I strongly propose that there be a



standard educational policy for popular computer programs. This will help more people participate in digital communication easily.



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