Strategies for Bridging the Digital Divide in Education between South and North Korea after Unification

Ilju Rha[1]

Department of Education, Seoul National University

Eun-Mo Sung[2]

Department of Education, Seoul National University

ABSTRACT

The paper explores ways of bridging the digital divide between the two Koreas and applying ICT to educational development that will be mutually beneficial to North and South Korea on the way towards and after unification.

It compares thinking and developments on both sides of the peace line and identifies the different priorities and programs that are currently under way. It shows that North Korea has a great interest in training professionals in the field of digital education but because of its economic conditions. North Korea is selectively training an elite core of ICT specialists to work in a few elite institutions and is still at the embryonic stage of development. By contrast, South Korea's educational development and e-transformation is at the proliferation stage. These differences are seen as constraining educational and economic development when unification becomes a reality.

The study suggests that there should be a collaborative approach to addressing these issues and that this should be embarked on as soon

1) Contact E-mail: iljurha@snu.ac.kr
2) Contact E-mail: eunmo04@snu.ac.kr

as possible. It argues that this should be needs-based and built upon mutual understanding. It also envisages that there will be a need for a cross-sector approach, legal, regulatory and policy changes, expanded access to ICT, enhanced capacity to utilize ICT and professional development and it suggests how these might be achieved within a framework of peaceful coexistence and cooperation in education.

Key words: Unification of South and North Korea, digital divide in education, ICT in education

Ⅰ. Introduction

The advance of information and communications technology (ICT) has revolutionary implications for maximizing human resource potential, achieving knowledge-based societies and enabling economies to be globally competitive (Booz Allen & Hamilton, 1997). Accordingly, every developed and developing nation is developing ICT infrastructure and harnessing technology for educational and socio-economic development.

As Lee & Hwang (2004) observe, the conditions for and development of ICT in North Korea are little known in the world. The government in Pyongyang restricts political uses of ICT, but it acknowledges the powerful influence of new technology on the economy and society and in the late 1990s it adopted a 'Science and Technology Urgent' policy with the aim of enabling the science and technology sector to become the foundation of economic and social development and help North Korea become an advanced nation of influence in the world (Ko, 2003). However, due to its geopolitical circumstances and devastated economic conditions, North Korea faces many challenges in transforming itself into a modern industrialized society (Seo, 2001), investing in technology, utilizing ICT in education and fostering human resource development.

Unlike North Korea, South Korea has been consistently implementing a series of visionary mid- and long-term plans for ICT such as Cyber Korea 21, e-Korea Vision 2006 and the 2003-2007 Broadband IT Korea Vision 2007. It is acknowledged worldwide and an ICT-advanced country, ranking first among OECD countries in terms of Internet infrastructure and use (National Computerization Agency, 2005; 2006) and fifth among 60 developed economies for its capacity to develop and apply e-learning (EIU, 2003). The national ICT in Education Project (Phase I in 1997-2000 and Phase IIin 2001-2005) built on the experience of the Enhancing Computer Education in Schools of the late 1980s, has resulted in outstanding computer provision and ICT infrastructure, with 4.4 persons per PC and 100% Internet access in schools, nationwide ICT pre- and in-service teacher training and extensive ICT-based resource creation and teaching and learning in schools, colleges, universities and workplaces (Rha & Yoshida, 2005).

The digital divide in education between South and North Korea appears unbridgeable as long as the North remains so politically isolated and insulated. Even with unification, there would not only be technological barriers to address but substantial social, economical and cultural problem differences of more than fifty years' standing. Furthermore, the costs of bridging these differences would be substantial. To achieve balanced development, it is clear that South and North Korea need to collaborate. The very process of collaborating in bridging the digital and educational divide, which closely interrelates with socio-economic development, could bring about a qualitative shift in the relationship between the two Koreas prior to unification.

Recent meetings between South Korean President Roh Moo-hyun and North Korean leader Kim Jong-Il point towards reconciliation between the two Koreas, which some predict will lead to unification. In the meanwhile, the two countries have pledged to pursue peaceful co-operation and end their decades-long standoff across the world's last Cold War frontier

and there may be opportunities for other forms of collaboration and development, for example, in bridging the educational divide between the two countries.

Ⅱ. ICT in education in South and North Korea: an analysis

The first step in addressing the massive task of bridging the digital divide between South and North Korea is to review the objectives and direction of ICT in education in these two countries, analyze and compare their ICT infrastructures, ICT in education curricula, and knowledge and skills for ICT-integrated education.

Objectives and direction of ICT in education

Mention has already been made of North Korea's 'Science and Technology Urgent' policy. Head of state Kim Jong-Il has endeavoured to initiate computer education throughout the nation, arguing that achieving ICT literacy and understanding of the potential of the technology was a pre-requisite for any of the other policies or programs needed to address the economic deadlock and prevailing poverty (Kim, 2000). Implementing such a program clearly calls for many ICT and educational experts but such are the economic conditions and lack of experience, knowledge and skills in ICT in the North that it has been impossible to apply this vision across the entire nation. According, the government has developed an 'Elite Computer Education' system, wherein only a few talented students are selectively trained to develop the types of programs and provisions called for (Kim, 2003).

By contrast, South Korea already has two decades of experience in developing the human and material infrastructure, educational and communications networks, teacher training and teaching methods for nationwide educational applications of ICT.

It is rapidly transforming itself to a knowledge-based society for the 21st century through its cyber education systems, e-competency building and infrastructure for lifelong education. This has been entirely due to enlightened and visionary leadership which has not only seen the need for computers and networks for ICT in education, but qualitative changes in educational content and methods, learners and their learning, and the educational environment in order to develop entrepreneurism, enterprise, self-reliance, creativity, problem-solving and a global perspective. The Ministry of Education and Human Resource Development (MOE&HRD) has also grasped that with knowledge doubling every two to three years and new technologies, new paradigms and new challenges and opportunities arising at ever shorter intervals, there is need for strategies for national human resource development that is lifelong, continuous and available to everyone, regardless of their locations and circumstances, that there is a need for a self-directed learning society educated through cyber space (Korea Education & Research Information Service, 2001).

Both North and South Korea share in the belief that developing human capital and building a new knowledge and information-based society are answers to economic competitiveness. However, the enormous digital divide that currently exists between North and South Korea due to the different political and socio-cultural ideologies, educational aims and strategic directions, could represent an enormous challenge, educationally, technologically and economically as the two countries draw closer and if, ultimately, unification becomes a reality.

A. ICT infrastructure for education

ICT infrastructure for education comprises the equipment needed for classroom or off-campus teaching and learning, access to the Internet/Web, and courseware in forms that are educationally and culturally appropriate. Let us see how these compare in the two countries.

In North Korea, the distribution of computers in schools is reported to be about 120:130,000 learners or one computer for every 185 students (Ministry of Unification, 2001). University faculty and students are mainly restricted to using 386 and 486 main processor computers. Computers with Pentium microprocessors are typically only available to members of the ruling party, high ranking officials, security officers and computer education personnel (Park, 2002). However, the situation may be worse than these findings indicate. There are major differences between computer provision in urban and rural areas. Schools in major cities may have several 32 bit computers wherever Windows 98 is being used, but schools in rural areas usually have single, old and poorly-performing 16 bit computers. More than fifty percent of North Korean defectors claim to have never seen a computer in a school and that in their experiences, no elementary schools had computers (Han, Yoon, Lee, 2001). There is extremely limited training and support for teachers and there is no evidence of curriculum reform or resource creation to exploit the educational potential of ICT.

In South Korea, by contrast, the level of provision in schools matches that of the advanced OECD countries – one computer for every 4.4 pupils. About 13,000 schools have computer labs, 210,000 classrooms are equipped with multimedia teaching facilities, and 340,000 teachers have their own computers (KERIS, 2006; NCA; 2006). Enhancing teaching and learning by applying ICT in educationally sound and innovative ways and providing on-going professional development have also helped to advance the ICT integration agenda and create the kinds of learning environments and attitudes required for nationwide e-transformation.

B. Educational applications of the Internet and Web

The Internet and the Web open a window onto the world, enable learners to access knowledge and information from anywhere across the globe at the click of a mouse and facilitate interaction, collaborative learning and creation of virtual learning

communities such as School Nets. The essential strengths of the Internet/Web are in the openness and mutually beneficial interaction, as in open source software and courseware, wikis, and so on.

It is reported that North Korea is showing an intense interest in the Internet and its educational potential but as with all other communications media in North Korea's reclusive society this is kept strictly under control, being perceived as threatening to public order and only usable by government authorities. The country has been granted its own national code (kp) but its domain has not been registered, which only further confirms peoples' suspicions that North Korea is the world' most reclusive, mysterious and insulated country (Park, 2003).

Turning to South Korea, in 2007, more than 40 million people were using Internet and the numbers of Internet users and super-highway network subscribers ranked first in the international Internet Index. In the last ten years, South Korea has built the Internet network for schools as part of its 'ICT in education' program and not only do pupils and university students have easy access to the Internet but their learning and learning environments have been enhanced by the adoption of imaginative Internet/Web-based teaching and learning methods (KERIS, 2006).

C. Software and courseware

North Korea has its own software industry and the level of its hardware industry is known to be advanced. However with its weak economy and poor ICT infrastructure, it would seem that the country would be better off focusing on and giving priority to competitive software development, which demands only intellectual and creative capital rather than its hardware industry which makes heavy demands on financial capital and requires a leading edge, comprehensive and sustainable infrastructure. Educational courseware is a potentially valuable part of software creation and the Kim Jong-Suk Teachers College,

to take but one example, is known to be a centre for educational software development, reputably producing more than 2,400educational programs in recent years, some of which have won awards. Other producers are known to have developed ICT programs for the intellectual development of young children and teaching foreign languages to pupils and adult learners (KERIS, 2001).

South Korea embarked on developing computer-based learning programs in the 1980s, and by 2000, was utilizing a wide range of Korean content in its e-learning enterprises. Each provincial education department operates its EduNet or database for teaching and learning resources and an array of content has been developed using digitized video, multimedia such as Flash, mobile or m-learning and satellite and Digital Multimedia Broadcasting (DMB) to raise e-provision to unprecedented levels.

D. ICT curricula in North and South Korea

North Korea is currently concentrating on providing computer education to develop the knowledge and skills of a select few computer programmers and ICT specialists to serve a limited number of institutions ranging from elementary schools to graduate schools (Ko, 2004). Little is known about the subject uses of ICT or number of credit hours in the country's elementary schools but is understood that there are some computer education programs delivered via television and uses of electronic games. In middle schools, ICT-based education is introduced in Year 2 for 12-years olds. This takes two forms. The first is an introduction to the basics of using computers, which occupies two hours a week (Park, 2004; MOU, 2004b). This covers the basic structure or principles of computer operations and logical processes based on the maths, computer languages, BASIC, algorithms, and so on (MOU, 2003). The second only applies in those schools where the elite computer education system we described earlier is operational, for example at Pyongyang 1st Middle School, Kumsun Academy and 1st Kumsun Middle School (Yonhap News, 2006b). The pupils

involved in this – about 1,200 in all – are selected from across the nation through various examinations and tests and are intended to provide the core of a new generation of highly skilled and competent programmers. These elite schools have relatively well equipped computer labs. They lack Internet connection butare tapped into an intranet that connects them to libraries, universities, research institutes and the other elite schools. The teachers are typically professors and researchers from Kim Il-song University, Kim-Chaek University, Pyongyang Computer Technical College, Korea Computer Center, etc. (Ko & Park, 2001). Song & Choi (2005) observe that these more talented students are being well-versed in the principles and practices of computer operating systems.

ICT in higher education is similarly divided. Firstly there is the elite computer education provision for talented students, aimed at creating a new generation of ICT specialists, and based in Kim Il-song University and Kim-Chaek University of Technology (Park, 2004; Nam, 2003). Kim Il-song University established its Computer Science College (CSC) in 1999 to improve the quality of its professors, train talented computer programmers and support computer skills development in the various sectors of North Korean society. Kim-Chaek University of Technology focuses more on computer technology as applied science, operating computer systems and producing software. It has also developed a state-of-the-art e-Library in collaboration with Pohang University of Science and Technology in South Korea and Syracuse University in the US. The second, more general form of computer education, as provided in for example, Hamhoong University of Computer Technology, and Pyongsong Science College, is designed to produce teachers of computing and computer engineers and is more practical than theoretical in nature (Song & Choi, 2005).

Turning now to South Korea, the provision of ICT integrating and training in ICT is across the board and designed to ensure that ICT underpins improved approaches in teaching

and learning from elementary school to university level. For the past twenty years or so, national curricula have been revised, ICT has been adopted and adapted, classroom environments have been improved and changed and a wide variety of ICT-based materials have been developed, tested and brought into general use. To nurture creativity and independent thinking among the new generation of learners and workers, the government has drafted 'Guidelines for Adapting ICT into Elementary and Secondary School Education'. This emphasizes the need for basic ICT training and education for all Koreans and offers recommendations for reforming the school curriculum and pedagogy by explaining which teaching styles are most effective for the different subject areas (KERIS, 2003). In the schools, basic ICT training is a requirement from 1st grade to 10th grade and this includes such topics as Understanding Information, ICT Ethics, Basic PC Skills, Using Software Programs, and PCs and the Internet. The MOE & HRD (2005) recommend that at least 10% of the teaching and learning should be ICT-based to ensure that students are familiar with using the technology across the curriculum and that ICT is embedded in all school subjects. The aim of this is to produce a citizenry capable of creating and sharing knowledge across society and in a spectrum of activities.

The previously referred to 'Use of ICT in Higher Education'policy strives to expand ICT infrastructure to improve user access to information, introduce ICT into university teaching, learning and research, and use ICT in ways that make administration more transparent and efficient, all of which are seen as vital steps in creating an educational and academic research environment that will produce graduates who can lead the knowledge-based society of the 21st century. E-learning support centers have been established in many universities and they were equipped with necessary facilities to offer alternative methods to regular university courses through e-Learning solutions. These centers will develop and provide content and share its facilities among colleges and college departments

(KERIS, 2006). The development of advanced ICT is also enabling Koreans of all ages and circumstances to engage in lifelong learning through courses offered in the country's newly-established cyber universities, 23.3% of whose courses are management-related and 21.5% ICT-related. Certificated courses from these institutions are growing in popularity. These cyber universities are different from regular universities in that, they offer academic majors based on teaching fundamental theories, because they offer retraining for adults and are more focused on meeting market demand (Jung, & Rha, 2004).

E. Professional development for ICT in education

North Korea's goal for ICT in education is to foster andutilize ICT for human resource development. The computer facilities are currently too limited to achieve this but even if technical provision was stepped up enormously, the technology will remain unused or under-exploited if the teachers still lack the knowledge and skills in applying ICT in classroom and distance education settings, as is the case with the majority of lecturers and teaching staff (Ko, 2004 Institute for Peace Affairs, 2004).

South Korea understands the needs for such professional development for its teaching force. The MOE & HRD have developed a set of ICT skills standards for teachers and a teacher training curriculum that not only enables the teachers to work with computers and the Internet but introduce ICT into the classroom and exploit digitized and Internet resources (KERIS, 2003). Initially, this program aimed to train 25% of the teaching force every year on a four-year cycle. It has now been extended to train over 33% of all teachers a year and the focus has moved more onto curriculum and pedagogical development for ICT-integrated education, advanced applications of ICT and educational problem-solving (KERIS, 2005). The emphasis is now essentially on e-learning and is increasingly provided through e-learning so that teachers can experience these new modes of information access and knowledge utilization for themselves. A

new framework and a variety of educational resources are being developed and deployed and these changes are expected to be continuous and accelerating.

III. Proposals for bridging the digital and educational divide

As shown above, the gap of ICT in education between South and North Korea is vast and a potential obstacle to progress towards unification. It would be posited that bridging this gap requires:

- A needs-based, collaborative approach built upon mutual understanding
  - A cross-sector approach
  - Legal, regulatory and policy changes
  - Expanded access to ICT
  - Enhanced capacity to utilize ICT
  - Professional development

A. A needs-based, collaborative approach built upon mutual understanding

Moran and Mugridge (1993) identify the following pre-requisites for successful collaborative distance education:

- An ability to accommodate different institutional cultures, practices and assumptions about curriculum and pedagogy.
- Shared values, personal trust and institutional champions.
- Perceptions of mutual benefit.
- Agreement on how the partnership is to be led, managed and marketed, the roles and status of the various members, and how the programs and services are to be provided and degrees awarded.
- Agreement on the start-up funding required, who is to provide this, and how the profits and other benefits are to be

shared.

Therefore the changes outlined below are seen as needing to be preceded by a political framework that enables these policies and procedures to move forward and, equally importantly, mutual understanding and trust developed between administrators, educational and technology specialists and researchers. Form the very outset, exchanges of personnel, conferences and meetings, online conferencing, joint research activities, etc. are needed to ensure that there is clear understanding of the priorities to be pursued and the implications for policy-making, planning, resourcing, and professional development required. Maximizing contact between all of the personnel involved will also enable them to work with, rather than around, established interests and influences.

B. A cross-sector approach

In addition to government bodies and educational providers, there may well be scope and need for involvement by other sectors. For example, Korea is a world leader in research and manufacturing in computing and telecommunications and it is conceivable that industry could develop and apply technology solutions that are not only beneficial to this program but serve to market such leading edge solutions to the world. Large and medium size employers also need training for their personnel and this too can be provided in the form of e-learning and blended learning. And while the focus of this paper has been on formal education, ICT, distance and e-learning are also shown to be capable of playing and major roles in providing non-formal adult education and alleviating poverty and disadvantage, improving healthcare and childcare and supporting community development and enterprise in remote and disadvantaged regions. Providing for such needs requires exactly the same commitment to access, equity and lifelong learning and skills, practices, technology and infrastructure as in the formal sector. So all of these possibilities may also need to be considered. The kinds of development envisaged in this paper

are also bound to attract a great deal of interest worldwide and may receive offers of support from such international agencies as the Bill and Melinda Gates Foundation, Intel, UNESCO and the Japan International Cooperation Agency.

C. Legal, regulatory and policy changes

South Korea's and North Korea's current goals and directions for ICT in education come from different positions. South Korea focuses on the human resource development requirement of utilizing ICT and education to develop creative, enterprising and problem-solving individuals for the 21st century. North Korea on the other hand, perceives the human resource development aspect in terms of developing the knowledge and skills of a number of elite computer experts and institutions, rather than students in general and across the entire education system. This latter approach is understandable, given the impoverished economic and ICT environment of North Korea, but this distinction may well inhibit unification of the two countries' economies, education systems and social fabric. So as a first step, there needs to be wide-ranging discussion aimed at developing consensus on the goals and desired directions of ICT in education and what is entailed in bridging the intra-national digital divide. Using this 'platform of ideas', there could then be negotiations on the legal, regulatory and policy changes needed to achieve these goals within the two coexisting countries or a united Korea. Agreement would also be needed on the collaborations, practices, and standards needed and who is to be accountable for implementing and monitoring these.

This would appear to call for some over-arching organization that is authorized and empowered by the government(s) to:

● Reflect the views and aspirations of both Koreas and all sectors of education and training.
● Prepare and implement policies, procedures and practices.
● Establish key performance indicators, benchmarks, targets and time lines.

● Co-ordinate and manage implementation.

● Ensure the provision of the necessary human and material resources.

● Diagnose the need for and encourage and support new and improved ICT-based teaching and learning methods.

● Encourage and support academic exchanges (face-to-face and online) and other events that will make for smooth transition.

● Evaluate all of these developments to ensure that they achieve the desired outcomes.

D. Expanded access to ICT

With such a vast divide between the two countries in terms of technology, infrastructure and access and openness to ICT utilization, another top priority must be the provision of hardware and an Internet network for North Korea's educational institutions. In the current political environment, this may be hard to achieve, but it must be recognized by all parties that such investment will help to reduce the costs of preparing for a unified Korea and narrowing the differentiated cultural impact. As it is sometimes observed, 'if you think knowledge is expensive, try ignorance'.

South Korea is constantly upgrading its computers and it may be possible to collect, renovate and upgrade computers from government offices, private organizations and educational institutions for re-use in North Korean schools, colleges and universities. North Korean personnel could also be trained and employed in this task. This would in part reduce the initial investment needed to bring North Korean institutions up to standard and recycling these computers would also help to avoid environmental pollution caused by constantly discarding obsolete technology.

Another option is to adopt, or better still, for Korea to manufacture, the kinds of cut-price laptops prompted by the US$100 laptop of the non-profit One Laptop Per Child project

and now being developed by other brands such as Intel and PicoPeta Simputers Pvt. Ltd.

High priority must also be given to constructing a satellite network. North Korea currently has a very weak and incomplete ICT infrastructure and its mountainous terrain and low population density outside Pyongyang make a cable network unfeasible. A satellite-based system would be easier to establish and equally importantly, given the concerns that unification implies boundless aids grants, could be put in place at half the cost of a cable network. Bridging the digital divide in the ways envisaged above could involve a whole raft of technologies – computers, cell phones and PDAs, radio and television, DMB/DAB devices, programs delivered through direct to home players (DTH) and very small aperture terminal (VSAT) technology, and so on, dependent upon the unique needs and concerns of the region, so the network would need to be capable of supporting all of these services.

In the early stages, is it envisaged that this infrastructure would be best directed towards serving a strategically significant and populous area where the need is greatest and the technical provision weakest. Providing computers and an Internet network throughout the entire North would not only be prohibitively expensive but well in advance of North Korea's readiness for an all-in-one policy for widespread ICT provision, access and utilization. Selecting a key area where there is a large and varied range of potential users, need, people interested in utilizing ICT but the technology and infrastructure is lacking would enable personnel to be trained, pilot projects and programs to be run and evaluated, costs and resource requirements to be monitored and then, building on this experience, these applications to be expanded throughout the remainder of the network. It is not simply a question of providing the physical resources for such development. There must be opportunities for the users to change their attitudes, develop new mind sets and acquire new competencies in regard

to media, technology, information access and teaching and learning (Kim, 2004; Lee, 2004). Development needs qualitative as well as quantitative improvement.

E. Enhanced capacity to utilize ICT

There is clearly a major educational gap to be bridged here as well as a technological gap. Not only does North Korea have limited infrastructure, but limited experience of the kinds of educational reforms and qualitative improvements occurring in the South and relatively few experts in ICT integration in education. So there is great need for academic exchanges, conferences and seminars and mechanisms and incentives for university faculty, graduate students, researchers and school teachers to share in developing the ideas, strategies, projects, programs, technological provision, courseware development and new teaching and learning approaches. Experience in educational development shows that lecturers and teachers are far more likely to heed what other lecturers and teachers say and do rather than research findings or the advocacies of 'outside experts' say. Considerable cultural change is involved in this process and so the new approaches have to be nurtured within the educational communities, not imposed from outside. So there is a need for collaborative professional development, collaboration in researching e-learning development and application, and not only between scholars, researchers and the practitioners but from all sectors and levels to find practical, feasible ways of bridging the educational and digital divide. This may require particular schools, colleges, universities or other providers to be assigned specific research and development roles, and may even prove to be a difficult and controversial process, but without such partnership, the goals cannot be achieved

Synergy and standardization are other important goals. North Korea has developed software and science education courseware, while South Korea has developed a mass of high quality instructional and multimedia resources for almost every subject area. It clearly makes sense to share South Korea's rich

educational content and software with North Korea, and to share, say, North Korea's advanced technology in artificial intelligence with South Korea. This will help to achieve the necessary synergy and forward momentum. There will also be need for the adoption of a Shareable Content Object Reference Model (SCORM) to ensure a common e-learning standard within Korea and globally (Han, 2002) and that courses and courseware are 'Re-usable, Accessible, Interoperable and Durable' (RAID).

It is also extremely important that all of the partners in this enterprise share the same terminology for ICT in education. There are currently differences in the terminology used by North Korea and South Korea and this could lead to a situation encapsulated in the Indian legend of the blind men feeling the various bodily parts of an elephant, the one feeling the leg saying that it was a tree, the one feeling its trunk saying it was a snake, and the one feeling its tail that it was a rope. Differences in terminology betray differences in conceptualization and can lead to miscommunication, misunderstanding, alienation and confusion. Gaining agreement upon common terms will avoid barriers to understanding and lead to better performance and outcomes.

Some form of Teaching and Learning Centre is an essential component of any systems set up to lead, manage and guide the above policies, plans and actions. Such a Centre is needed to undertake the all-important needs diagnosis, plan, promote and support new forms of teaching and learning and ICT utilization, adopt, adapt, create and make available e-learning and other resources, provide professional development, support academic exchanges and other events, conduct formative and summative research and evaluate processes and outcomes. The nature and location(s) of such a centre needs concurrence by both sides but it can also be a 'virtual centre', developing and delivering online staff development and support through the satellite network to 'learning communities' in institutions or clusters of institutions. It is important that e-learning be seen as being capable of

providing quality and timely resources, support and information exchange, regardless of time and distance, across an entire system and at minimal cost.

F. Professional development

Ultimately, the impact and success of the measures outlined above will depend in great part upon the quality of the personnel who actually determine and implement the policies and plans, manage and operate the system, and work with the learners and other end-users. This presents a major challenge in terms of recruitment and initial and in-service training. Even though the North has had the opportunity to be supported by the South in its teacher training, there is still an acute shortage of personnel with the necessary knowledge and skills to achieve ICT integration in education. South Korea by comparison, has a number of graduate programs in instructional design, educational technology and e-learning and many of its professionals in these areas have studied overseas. However, it is reported that the thirty North Korean researchers from Kimilsung University and KimChaek Technology College who were involved in the Hana Program Center built in China in 2001 demonstrated outstanding intellectual abilities and capacity for this work (Younhap News, 2006a). So clearly, North Korea can provide some professionals in ICT applications. And again, every use can be made of e-learning and blended learning to train the maximum number of personnel in the shortest possible time, at the lowest possible cost, to the highest possible standard. At the same time, it will be important to recruit new personnel with the required motivations, qualifications and experience and to ensure that all of the participants in the process can share their achievements, knowledge, problems and findings by visiting each other's facilities, collaborating in the development processes, engaging in research and motivating and supporting their colleagues.

IV. Conclusion

In this paper, we have outlined the nature and extent of the

digital and educational divide that currently prevails between the two Koreas, argued that the current differentiation has educational, economic, social, provincial and gender-related implications for the course of unification, and suggested the steps needed to achieve a collaborative response to these challenges. The proposals we make here are more likely to take root if South and North Korea were to reunify and there was agreement between the key government agencies on the need for such technical and infrastructure provision and educational changes and developments. However, we would argue that the realization of co-existence, prosperity, well-being and competitiveness in the face of globalization requires South and North Korea to start thinking and acting collaboratively now in order to set the mid- to long-term goals and strategies to fully utilize the educational potential of ICT, enhance education and understanding, and prepare for future unification.

Such are the economic circumstances of North Korean that while South Korea is at the proliferation stage of ICT utilization in education, North Korea is only at the embryonic stage and there is an enormous digital divide both within North Korea and between North and South. On the positive side, it must be acknowledged that North Korea is striving to develop the country's economy, has a 'Science and Technology Urgent' policy and is giving high priority to developing a core of talented computer education experts. On this basis, it is argued that collaboration on ICT integration in education is both desirable and feasible.

In this article, we have focused on the adoption of technology pursuit of educational access, equity and quality, rather than political, economic, social or cultural transformation. It is recognized that these are sensitive matters and so while they may need attention or even be a prerequisite for unification, the approaches suggested above are built on the supposition that regardless of political agendas, both countries seek to achieve the very best for their citizens and recognize the

importance of education and lifelong learning. It is hoped that policy-makers, planners and practitioners in both countries can accept the need for collaboration in applying ICT and e-learning in ways that are mutually beneficial, while acknowledging and accepting each other's long-established patterns of thinking, working and living. Working together, both sides can achieve great things that will be hailed internationally. Maintaining the separation, they will lose the opportunity to co-exist and prosper.

References

Allen, B. & Hamilton (1997). *Korea Report*. Seoul: Maeil Business News Paper.

Choi, S. (2006). IT Human Development and SW interchange cooperation in North Korea. *Journal of the Korean Association of information Process*, 13(5), pp. 45-53.

EIU (2003) The 2003 *e-learning readiness rankings*. The Economist Intelligence Unit Limited. http://www-304.ibm.com/jct03001c/services/learning/solutions/pdfs/eiu_e-learning_readiness_rankings.pdf

Han, M, K., Yoon, J. H., & Lee, J. K. (2001). *The Reality and Change of North Korea Education*. Seoul: Korea Education Development Institute.

Han, T. M., & Seo, D.W. (2002). *A Standard Development Methodology Based on SCORM*. Seoul: Korea Education & Research Information Service.

Institute for Peace Affairs. (2001). *Interview with North Korea Defectors*. 2006.12.13, http://www.ipa.re.kr/f_index_kor.htm

_____. (2004). *Interview with North Korea Defectors*. 2006.12.13 http://www.ipa.re.kr/f_index_kor.htm

Jung, I. S., & Rha, I. J. (2004). *Understanding Distance Education*. Seoul: Kyoyook Book.

Jung, I.S. (2007 M). Editorial: Changing faces of open and distance learning in Asia. International Review of Research in Open and Distance Learning, 8(1).

http://www.irrodl.org/index.php/irrodl/article/view/418

Kim J. H. (2000). *Strategies for Building North Korea of the Grate Power*. Pyongyang: Pyongyang Press. pp.31-37

Kim, C. H. (2003). *Information and Communication Technology of North Korea*. Seoul: Thinking Publishing Co.

Kim, J. I. (2003). *Korea Dynasty*. Pyongyang: Korea Dynasty Labor Party Press.

Kim, M. J. (2004). The Change of Social Discrimination Structure. *Journal of IT Socialize & Culturalize* , 2004(23), pp. 1-104.

Kim, Y. C. (2000). *International Variable of North Korea's Information Society*. Kyungnam: Kyungnam UniversityPress.

Kim, Y. H. (2001). Study on IT Development Strategy in North Korea. *Journal of North Korea Studies*, 4(2), pp. 191-224.

Ko, K. M. (2003). A Status and Evaluation of Internet Government in North Korea. *Journal of Konkuk Political Science Association*, 16, 75-106.

————————. (2004). IT strategies of North Korea. Seoul: Communication Books.

Ko, S. S., & Park, K. E. (2002). *Kim Jung-Il and IT Revolution*. Seoul: Bestbook.

Korea Education & Research Information Service. (2001). *2001 Adapting Education to the Information Age*. Seoul: Korea Education & Research Information Service.

——————— (2002). *2002 Adapting Education to the Information Age*. Seoul: Korea Education & Research Information Service

——————— (2003). *2003 Adapting Education to the Information Age*. Seoul: Korea Education & Research Information Service

——————— (2004). *2004 Adapting Education to the Information Age*. Seoul: Korea Education & Research Information Service

——————— (2005). *2005 Adapting Education to the Information Age*. Seoul: Korea Education & Research Information Service

——————— (2006). *2006 Adapting Education to the Information Age*. Seoul: Korea Education & Research Information Service

Lee, C. K. (2005). *Science and Technology of North Korea*. Seoul: Hanul Publishing Co.

Lee, H. & Hwang, J. (2004) ICT Development in North Korea: Changes and challenges, *Information Technologies and International Development*, 2(1), September, 2004, pp. 75-88.

Lee, J.S. (2004). *Toward Equal Society from Digital Divide*. Seoul: Communication Books.

Ministry of Education & Human Resources Development (2005). *Guidelines for Adapting ICT into Elementary and Secondary School Education*. Seoul: Ministry of Education & Human Resources Development.

Ministry of Unification (2001). *2001 Synthesis Assessment of North Korea Economic*. Seoul: Ministry of Unification.

_____ (2003). *2004 North Korea Overview*. Seoul: Ministry of Unification.

_____ (2004). Human Development of Hi-Technology Science Part. *Weekly North Korea*, 681. 20-23.

Moran, L. & Mugridge, I.(1993). Trends in inter-institutional collaboration, in L. Moran & I. Mugridge (eds.) *Collaboration in Distance Education,* London: Routledge.

Nam, S. W. (2003). *Development IT Industry and Great Power Construction in North Korea*. Seoul.: Hanul Publishing Company.

National Computerization Agency. (2005). *2005 National Informatization White Paper*. Seoul: National Computerization Agency.

_____(2006). *2006 National Informatization White Paper*. Seoul: National Computerization Agency

National Internet Development Agency of Korea. (2006). *2006 Korea Internet White Paper*. Seoul: National Internet Development Agency of Korea.

Park, C, M. (2003). Strategies of Information-oriented Society in North Korea. *Journal of Science & Technology*, 35(12), pp. 20-22.

_____ (2004). Digital Divide between South and North Korea aspect of Academic Society. *Proceeding 1st Conference for Solve the Problem of Digital Divided Between South and North Korea*. pp. 32-47.

Park, M, W. (2004). Status and Measures in Digital Divide aspect of Information education Between South and North Korea. *Issues Report on the Digital Opportunity*, 1(6), pp. 1-42.

Rha. I. J., & Yoshida (2005). A Comparative Study on ICT Policy in

Education in Korea and Japan. *Educational Technology International, 6(1)*, pp. 3-39.

Seo, J, J. (2001). *North Korea; Shifting from a Shortage Food to IT Industry*. Seoul: Research Center for Future Human Capital.

Sin, H. S (2006). Issues and Prospects of North Korea Education Study. *Journal of Korean Unification Studies*, 15(1), pp. 131-158.

Song, K. J., & Choi, K. J. (2005).A Study on IT Education in North Korea. *Journal of North Korea Technology*, pp. 65-104.

Yonhap News. (2006a.6.27). *Break Bread with South Korean teachers and North Korean Students in field of IT*. 2006.10.8, http://news.naver.com/news/read.php?mode=LSD&office_id=001&article_id=0001339897&section_id=100&menu_id=100

Yonhap News. (2006b.9.8). *North Korea, Focusing on Cultivating Elite Computer Education*. 2006.10.12, http://www.yonhapnews.co.kr