

Book Chapter: Education Technology in Nepal

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Educational Consultant's Guide to effective use of Education Technology in Nepal, within the broader region of South Asia

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Introduction

Within a few decades, Information and Communication Technology (ICT) has turned out to be an effective educational technology that promotes some dramatic changes in the teaching and learning process. The teacher student role has been changed due to this, and productivity improvement opportunities made available. In short, ICT has the potential to transform the nature of education (Khan, 2012).

The growth of information and communication technologies (ICT) has dramatically reshaped teaching and learning process (Pulkkinen, 2007; Wood, 1995). ICT for education is more critical today than ever before since its growing power and capabilities are triggering a change in learning environments available for education (Pajo & Wallace, 2001). The use of ICT offers powerful learning environments and can transform the learning and teaching process so that students can deal with knowledge in an active, self directed and constructive way (Volman & Van Eck, 2001; De Corte et al.,2003). In today's world, ICT is considered an important mean to promote new methods of instruction.

There are many barriers that exist in implementation of ICT in education like access to technology, training in its use and institutional support. Also, there are more intrinsic barriers such as people's perception of the use of technology and their willingness to change. Overcoming such barriers and creating learning materials and activities for use in technology, while also adapting the instructional needs for different contexts or different groups of learners would be the best way to go about using technology in education (Tsai, C.C., 2012).

There is an almost universal recognition of the need to integrate technology into education in today's world. There needs to be an evolution from the thought that technology is a cure for all and realization that it is just another tool, albeit one with great potential.

Governments have used ICT as a policy instrument while planning in education to bring about positive change in that sector (Zhao,Y., Lei, J., Conway, P.F., 2006). Policy is the driving force for a larger scale change over time in a country. However, there are always within country variations that might not be covered by national level analysis, and we should be careful to consider those too when we are studying education technology in any country.

This chapter is an education consultants guide to effective use of education technology in Nepal, within the region of South Asia. Other countries that have similar conditions to Nepal are Bangladesh, India, Pakistan and Sri Lanka in the region. All the countries in South Asia are developing countries, and the Hindu Kush Himalaya Mountain and hilly ranges dominate much of the area, especially in Nepal.

Context

Geography, Climate & Demographics

Nepal is situated in South Asia, between India and China. It lies between latitudes of 26 and 31 degree North, and longitudes of 80 and 89 degree East. **Geographically**, it has 3 major regions as the mountains, hills and plains. The area of the country is 147,181 square kilometers (56,827 square miles), slightly smaller in size than the US state of Illinois, and has a **population** of 26,494,504 (2011 Census). The capital City is Kathmandu.

Nepal has 5 **climatic** zones that correspond to altitudes. The tropical and sub-tropical lie below 1200 m, temperate zone lies between 1200 and 2400 m, cold zone between 2400 and 3600 m, the subarctic between 3600 and 4400 m and finally the arctic zone above 4400 m. It generally experiences 5 seasons: summer, monsoon, autumn, winter and spring. Nepal has seven of the 10 tallest peaks in the world, including Mount Everest- the tallest at 8848 meters above sea level.

Social-Cultural & Ethnic

Nepal's modern history begins with its unification of smaller nation states within the current area of Nepal in the mid eighteenth century by the Gorkha King Prithivi Narayan Shah. This unification coincided with the British colonization of the Indian sub-continent, which meant that there were attempts by the British to take over Nepal, even till the mid nineteenth century. Nepal fought a few wars with the British, but was able to maintain independence, although the British did manage to indirectly control the dynasties that ruled over the country. On the Northern side, Nepal had trade relations with Tibet, occasionally fought wars with them over various disputes- which also led to confrontations with China which protected Tibet militarily back then.

Nepal has many languages- most of which originates from the Indo-Aryan family and some from the Tibeto-Burman family. Nepali, Maithili, Bhojpuri, Tharu, Tamang, Nepal Bhasa,

Bajjika, Magar, Doteli, Urdu, Awadhi and Sunwar are major ones. The major **religions** in Nepal are Hindu, Buddhist, Islam and Christianity. Gautam Buddha was born in a place called Lumbini in present day Nepal. The majority of followers of Hinduism are from Khas family, which makes their traditions quite different from the one associated with Hindu's elsewhere. The **culture** of Nepal is a hybrid of many different groups but dominated by Khas Hindu, Newar (original inhabitants of Kathmandu, both Buddhists and Hindus) and Tibetan Buddhism cultures.

The diversity of ethnic groups within Nepal means that various **customs** are followed in Nepal. Most of these customs originate from Hindu, Buddhist or other religious beliefs. Some traditions like not eating beef originate from Hindu practices. Cow slaughter was illegal in Nepal till 2006 when Nepal was still a Hindu nation. Some primitive practices like considering women impure during menstruation period, caste system based lifestyle and marriage practices are still followed.

Political

For most of modern history, **politically** Nepal has been a **kingdom** under the Shah dynasty. However, the Rana **oligarchs** with strong ties to the British colonialists were the ones that controlled Nepal in a dictatorial fashion till the mid twentieth century. Nepal became a democratic country in 1990, with a **constitutional monarch** like the one in the United Kingdom. However in 2006, after a decade long Maoist insurgency, it was decided to end the monarchy, leading to the formation of a **federal republic** in 2008.

The **government** of Nepal has a constitution that describes Nepal as having multi-ethnic, multi-religious, multi-lingual and multi-cultural democratic characteristics. Nepal has three branches of the government, the executive, legislative and the judiciary. The general term of the government is five years after which an election is held.

Economic

The **GDP of Nepal** is US\$ 27.278 Billion in 2018 with a growth rate of 6.5%. The GDP per capita income is US \$ 918.9 in 2018. The agriculture sector comprises of 65% of the economy, followed by services at 21% and industry at 14%. 6% of the population lives below the poverty line. The GDP is highly dependent upon remittances from foreign workers (9.1% of GDP). The major industries are tourism, garment, food and beverages, metal manufacturing, herbs, etc.

Education

History

Traditionally, education system of Nepal was guided by Hindu culture that transformed into Gurukul seminary (Parajuli, 2013). Formal education was established in Nepal in 1853 AD with the establishment of the first school, Durbar School, in the country. This early school was mainly for children of elite and advantaged members of society. School was made accessible to the general public only after the establishment of democracy in 1951 AD. Education in Nepal from the primary school to the university level has been modeled from the very inception based on the Indian system, which in turn was the legacy of the British Raj.

Reforms

In 1951-1952, the adult literacy rate in Nepal was just 5 % of the population. After the introduction of the complete education plan in 1971, the education sector began to expand (Parajuli, 2013). The **National Education Sector Plan (NESP)** of 1971 that was financed by the USAID attempted to create a single unified system of public education in order to empower district education offices to run schools (Thapa, 2013). This plan led to the formation of the **Education Act** in Nepal, which still exists today (albeit, after many amendments).

After the re-establishment of democracy in 1990, education development was realized at a faster pace. The Net Enrollment Ratio (NER) for primary students in 1980 was just around 16%, but by 2003 it had risen to 83.5%. Although the enrollment rate

jumped in general, the last few decades of the twentieth century saw the proliferation of private schools providing better quality education as opposed to public ones. By 1998, due to quality issues and liberalization policy, there was a significant growth in private sector schools.

Expanding educational opportunities is a priority of the government: its current 2016 **School Sector Development Plan** seeks to graduate Nepal “ from the status of developing country by 2022” .

Current Situation

Much progress has been made to the education sector in recent years and the NER in elementary education has jumped from 66.3% in 1999 to 97% in 2016 (World Bank). Net enrollment rates in secondary school grew from 44.9% in 2007 to 60.4% in 2015. The most dramatic improvements have been made in increased female participation in education, as in between 1973 and 2016, the gender parity index for school enrollments in elementary and secondary education jumped from 0.17 to 1.08, which means there is slightly more females enrolled than males.

Having said this, the education sector is plagued by high drop out rates, especially for females. The completion rate of lower-secondary education stands at 69.7% (2016) and drops to 24.5% at the upper-secondary level (2014). Lower casts and underprivileged groups remain underrepresented in education system.

In the country as a whole, the adult literacy rate is remarkably low at only 60% (in 2011), with only 56% of the Nepali population over the age of 25 attaining more than

secondary education. This is further reflected in a very low tertiary gross enrollment ratio of just 14.9% (in 2015).

Education Technology

History

Mass education arrived late in Nepal. It was not until the 1950's that the National Education System was established (Shields, 2011). Early efforts were focused on three pillars of literacy, vocational preparation and citizenship. During the first few decades, quantity over quality took hold with the rapid expansion campaigns.

However, the Ministry of Sports and Education adopted distance education early in Nepal through a youth program in 1957. Radio was used in the following decade to create a common language in Nepal as Nepali through educational campaigns through the radio. In 1973, a radio education program based on primary formal curriculum was launched, complete with self-study material. Again in 1978, with the help of USAID, the radio education teacher-training program began to address the shortage of qualified primary teachers in rural areas. This program ended up producing over 4000 qualified teachers in 5 years (MOES, 2006).

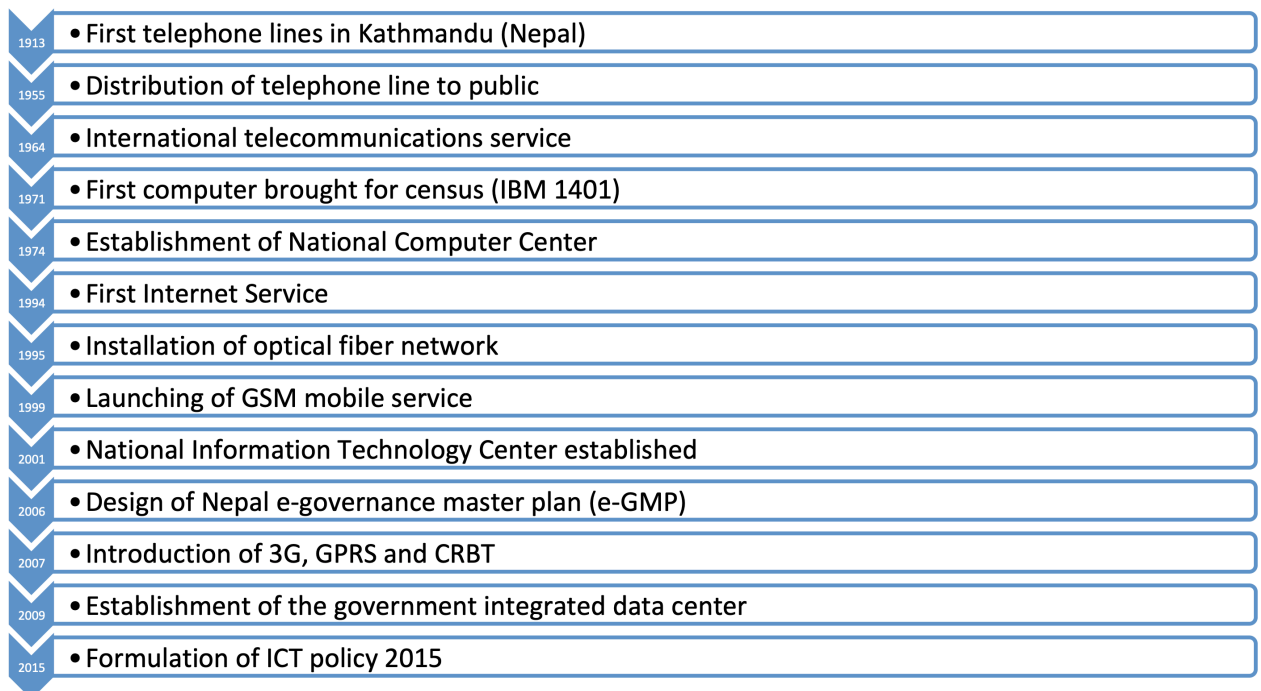
The educational efforts after 1990 focused on capacity building and reform on the education sector to expand basic education- which produced an increase in primary enrollment of 25% in just 8 years. However, these initiatives had no mention of ICT, and this was not a focus back then.

The policy push towards ICT that began in 2002 had a goal to use ICT for modernization and global competitiveness, and after that, in the following years towards a more of educational delivery. Beginning 2006, the discourse surrounding ICT focused more on the ideas of equity and inclusiveness. There is also kind of a return to the distance education strategy used in the 1950s by radio through ICT this time round.

The Information Communication Policy of 2015 is a regulatory framework created to address the holistic coverage regime of telecommunication, broadcasting and ICT. It provides a more consistent and well-defined policy than before.

Technology Standards and Reforms

ICT timeline of Nepal

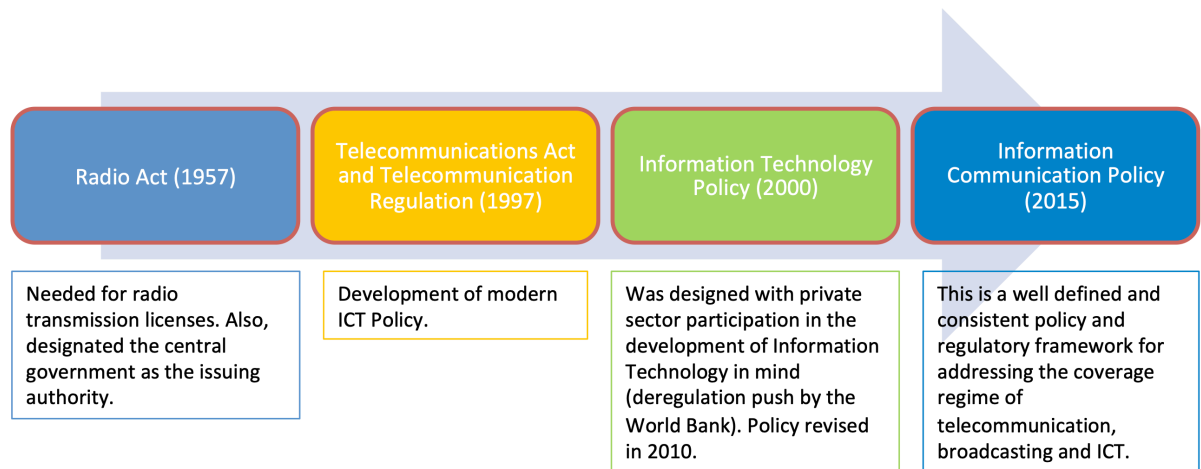


It has been just over a century since telephone was first introduced in Nepal. Nepal has been late to enter the telecommunications field, partly due to the harsh topography making large parts of the country extremely hard to reach, especially for physical infrastructure development.

The first computer brought to Nepal was the IBM 1401 by the government for census calculation purpose in 1971. Internet was introduced in 1994 and GSM mobile service in 1999. 3G, GPRS and CRBT were introduced in 2007.

The growth of mobile cellular technology has been quiet phenomenal in Nepal, allowing it to leapfrog in a sense, in terms of population and areas reached by technology. With major players in both the public and private sectors competing to provide better service at lower rates, a telecommunication boom has occurred in the last decade. Almost all of the country is in reach of cellular reception at this point.

Evolution of the ICT Policy Framework in Nepal



The Radio act was the first policy framework put in place in terms of ICT. The Ministry of Sports and Education adopted distance education early in Nepal through a youth program in 1957. The development of the modern ICT policy came about quiet late with the Telecommunications Act and Telecommunications regulation only in 1997. With the liberalization (and deregulation) push from the World Bank (a major donor to Nepal), the Information Technology policy was introduced in 2000, which was designed with private sector participation in the development of Information Technology in mind. This policy was revised in 2010.

The Information Communication Policy was introduced in 2015. This is a much more well defined and consistent policy and regulatory framework for addressing the coverage regime of telecommunication, broadcasting and ICT. This finally presented uniform policy coverage from information technology and communication.

Major Projects

Rural Telecenter

In 2004, the government of Nepal pushed for the establishment of telecenters (community access facility for computers and phones). This has had mixed results, and currently there are 410 telecenters in 73 districts (of the total 75) of Nepal. They provide services to rural community in the name of Postal Information Center.

E-government Initiatives

This was an effort to establish good government in Nepal. It had 8 master projects as priority ones which were groupware systems for government, government portal, national identification, e-education, communication network, enterprise architecture, Public Key Infrastructure and integrated data center.

Online learning at University Level

Two of the leading universities in Nepal, Tribuvan University (TU) and Kathmandu University (KU) have started online learning. KU offers online classes while TU has established e-library, conducted virtual classes, along with other electronic learning initiatives. The major difference between the two institutions is that TU has an independent center which is fully dedicated to online and distance learning, but KU

focuses more on a blended approach in which online distance learning is incorporated into regular on-campus programs.

Current Situation

There is an almost universal recognition of the need to integrate technology into education in today's world. There needs to be an evolution from the thought that technology is a cure for all and realization that it is just another tool, albeit one with great potential. Governments have used ICT as a policy instrument while planning in education to bring about positive change in that sector (Zhao, Y., Lei, J., Conway, P.F., 2006).

Education system in Nepal is highly influenced by content and examination driven practices. ICT has minimal role in secondary school education. A major obstacle, besides the obvious of lack of resources and development, is the low emphasis given to preparing students better able to function and become lifelong learners in the modern world.

Distance education, open schools and self-learning have all been introduced in Nepal. Its popularity is appealing since Nepal has many places that are geographically isolated. The Ministry of Education with the help of the learning sources from the Internet has implemented distance education in school level. However, the programs have a limited purpose (eg. Preparing for SLC, a major high school examination).

Policy wise, changes have been made to modernize, however, when we come down to implementation, little has changed in Nepal. The limited usage of ICT in education

mainly does not incorporate content that is actually made to use the technology, but rather as a supporting aid to the existing system.

Policy is the driving force for a larger scale change over time in a country. However, there are always within country variations that might not be covered by national level analysis. Most of the ICT use in education comes from programs run by NGOs or by the private schooling sector operating in a competitive environment (Shields, 2011). Nepal is getting into the global Internet culture of learning, as many students from Nepal have been a part of platforms like MOOCs. Nepali students have been taking degrees from different foreign Universities through distance learning for almost two decades now. Two Universities within Nepal are also providing distance education in both pure and blended distance learning.

Rapidly declining cost of hardware, software and telecommunication is making educational technology accessible to more and more people. Access to technology is an issue in rural areas, however, for mobile-based instructions, this might not be such a big barrier.

As instructional designers, there is a huge potential for planning and implementing modern education technology projects or interventions if we have policies that favor this shift.

Regional Picture

As we focus on **Nepal**, it makes sense to also compare it to similar counties in the region. The other regional countries that have been selected are the major ones in South Asia, including Bangladesh, India, Pakistan and Sri Lanka (intentionally leaving out

South Asian nations of Bhutan and Maldives because of their small sizes). Limiting to these countries in the region makes sense, as Asia is vast and includes sub-regions like East Asia, Middle East, Central Asia, and of course China, with their very unique set of circumstances that might be very different. However, **South Korea (Republic of)** has been mentioned just as a point of reference to what the best countries in terms of ICT development are doing in the world.

	Fixed telephone subscriptions per 100 inhabitants		Mobile-cellular telephone subscription per 100 inhabitants		Fixed-broadband subscription per 100 inhabitants	
	2000	2017	2000	2017	2000	2017
Nepal	1.12	2.94	0.04	123.17	NA	1.72
Bangladesh	0.37	0.43	0.21	91.63	NA	4.43
India	3.08	1.73	0.34	87.28	NA	1.33
Pakistan	2.2	1.49	0.22	73.86	NA	0.93
Sri Lanka	4.09	12.47	2.29	135.07	NA	5.85
Korea, Rep of	54.58	52.66	56.59	124.86	8.17	41.58

	ICT Development Index Score 2010	ICT Development Index Score 2017	Percentage Increase (2000-2017) in score	Global Ranking 2017	Relative Regional Ranking 2017
Nepal	1.75	2.88	65%	140	3
Bangladesh	1.61	2.53	57%	147	4
India	2.14	3.03	42%	134	2
Pakistan	1.79	2.42	35%	148	5
Sri Lanka	2.97	3.91	32%	117	1
Korea, Rep of	8.64	8.85	2%	2	

From the above tables ("Global ICT Developments, 2001-2018", 2018), we can see that Nepal lies somewhere in the middle in ICT development. Also Nepal has done tremendous improvement in this field since 2000, especially in terms of cellular mobile

technology. However, as seen by the usage of fixed broadband usage, non-cellular mobile ICT technology is still not used at an impressive level.

When we juxtapose the countries of South Asia to the Rep. of Korea, it is still clear that the region as a whole has quiet a long way to go to become among the best.

Within the South Asian nations, Sri Lanka leads in most indexes of ICT.

	Percentage of Households with computers in 2016	Percentage of the population with access to internet in 2017
Nepal	8.2	21
Bangladesh	6.88	18
India	12.96	34
Pakistan	15.9	16
Sri Lanka	17.77	34
Korea, Rep of	78.25	95

From the above table, we can see that in Nepal, a fifth of the population has access to the Internet (as of 2017), and less than 10% of households have computers (2016). Countries like Sri Lanka and India both are doing relatively better in both these measures. In reference to the portion of households with access to computers, Nepal is especially doing poorly in the region as only Bangladesh is doing worse.

The Nepal government spent 5.1% of the countries GDP in education in 2017. India, Pakistan, Sri Lanka and Bangladesh spend 3.8%, 2.8%, 2.8% and 1.5% of their GDP on education in 2017. Nepal is spending a larger share of their budget on education, which can be seen as a positive indicator in terms of potential for investments like technology in education. However, Nepal’s GDP was only USD 27 Billion (in 2018), so in monetary terms, this may not really amount to that much.

Future trends

We can observe from the information in the tables and the literatures that have been reviewed that most Internet access in Nepal is a result of cellular mobile, rather than other technologies. This leads us to infer that education technology that is mobile based (and uses mobile data) might be the most appropriate technology for the overall population at present, and in the near future.

This trend has come to play out in the past couple decades mainly due to the harsh hilly and mountainous topography of Nepal which makes making physical infrastructure and transportation difficult. Also, the private public telecommunication companies and their competition has allowed for better service at a rapidly falling cost. We can expect this trend to continue in the future with better mobile connectivity and usage in rural Nepal.

If we simply consider the mobile cellular telephone subscription, we can see that (above table) on average all Nepali citizens have more than one mobile phone subscription per person. Of course, this is an overly simplistic way to look at this data; however, it does show the high penetration level of this technology at present. In the near future, we can expect this to be the education technology medium having the highest potential for success as it has the ability to reach all over Nepal. Any education development effort in Nepal should consider the wide use of cellular phone and the not-so-reliable access to Internet in the country, if they wish to reach the rural areas that otherwise is hard to access.

Strengths and Challenges

The major **strength** for educational technology in Nepal is the high penetration of mobile technology in the country. The various mobile service providers have been able to provide services in almost all of the places in the country. Further, the cost to the consumer of the service in Nepal is massively lower if we compare it to the United States. The only area of concern in this is that mobile cellular reception can be erratic in some places and data speed low.

Another **strength** is that Nepali culture in general does not provide any restrictions to the use of any kind of technology. The country has a strong academic culture, especially in the urban areas, which are more likely keen to embrace new technology.

There are many **barriers** that exist in implementation of ICT in education like access to technology, training in its use and institutional support. Also, there are more intrinsic barriers such as people's willingness to change in terms of learning new technology and using them.

Nepal is a country with many ethnic, cultural, religious and linguistic groups. Hence education in Nepal needs to accept these differences. Also the mountainous and hilly landscape make physical infrastructure establishment difficult and transportation hard.

Challenges for distance education are inconsistency in program/policy implementation; lack of infrastructure and support (electricity, postal); lack of effective, dedicated and affordable telecommunications and the internet; and overall poor economic system.

Another often overlooked **barrier** is that even though hardware resources may have made it into the use for students, there are costs associated with acquiring and using educational software's. Using open sourced software's can help overcome this barrier, which may not always be possible.

In implementation of educational projects or interventions in places of South Asia like Nepal, the main **obstacle** might be to be able to design instructions for the use with technology. This is due to the fact that education system policy in most of these nations is more traditional in nature, and getting approval for technology-based instruction would be the foremost **challenge**.

Education Technology Resources

Key people in education technology

- Giriraj Mani Pokharel, Education Minister, Nepal
- Gokul Baskota, Minister of Communication and Information Technology
- Prof. Dr. Pushpa Raj Kadel, Vice-chairman, National Planning Commission
- Ram Kantha Makaju Shrestha, Vice-chancellor, Kathmandu University
- Prof. Dr. Tirtha Raj Khaniya, Vice-chancellor, Tribhuvan University

Key organizations and associations

- Ministry of Education
- National Planning Commission
- NGOs involved in education technology and ICT
- Private sector involved in education technology and ICT
- Development partners like the USAID

Points of contact

Education Technology/ IT programs at university

- Open and Education Center, Tribhuvan University
- Distance Education, Kathmandu University School of Education
- Nepal Open University

International organizations or projects

- Rural Telecenter
- Canada Forum for Nepal (CFFN)
- Open University Nepal Infrastructure Development Board (OUNIDB)

- Non-Resident Nepali Association (NRNA)

Factors to be considered when working in this country/region

- A strong belief in the value of technology for learning, along with a firm willingness to be open to personal learning is important for using a digital environment for teachers. Different cultures may look at this differently, but in Nepal, generally the attitude towards technology is favorable. Hence, there is a general positive view of technology use in education from a cultural standpoint.
- In the context of a country like Nepal, for ICT technology usage in education in general, the best possible way is to have software's to be free to use and able to run independently without any or much access to the Internet. There is most likely a similar situation in the whole of the South Asian region.
- There is a higher focus on developing communication technology as opposed to physical infrastructure in Nepal because of its harsh topography, and any ICT led educational effort should put this into considerations. Mobile technology and remote learning through Internet could have a good future in the education field in Nepal. This is also true for other mountainous regions in South Asia. However, this might not be the case in the plain lands across South Asia where building physical infrastructure and transportation are easier.
- Online mode of delivery responsive to handheld mobile devices with low cost data transmission is the best way to reach the online learners considering the barriers at the present time in Nepal. Penetration of mobile phones and Internet technology is almost universal in the region.

- Nepal is a country with many ethnic, cultural, religious and linguistic groups. Creating learning materials and activities for use in technology, while also adapting the instructional needs for different contexts or different groups of learners would be the best way to go about using technology in education (Tsai, C.C., 2012).
- A curricular approach that utilizes multiple representations, both by using ICT and traditional methods, that give students access to different facets of knowledge required to develop deep understanding (Gautam, 2017) would be ideal from a learning point of view. Multiple representations presented through layered activities will likely push students to further explore their educational activities. Even within a lower resourced setting (like most of rural Nepal), devices providing simple browser access can provide rich educational platforms for learners when used in combination with traditional methods. This would be the best way to implement educational technology at present in the region.

Conclusion

In countries like Nepal in the South Asia region, a clear government policy on the use of education technology in education can help in the development of this sector. However, we should also note the positive role of institutions beyond the public sphere, like private entities and non-governmental organizations working in this educational technology field, as they may not come under the direct purview of government policies, but still have contributed positively to the use of technology in education.

The remarkable success of cellular mobile phones in rural mountainous Nepal shows us the ability of new technology to penetrate into areas that no prior infrastructure had been able to reach well. A major reason for this success, besides the technology itself, was the affordability of the technology, which is also something very important. Although mobile data Internet access has reached throughout the country, signals are erratic in so many cases, and speeds low. Hence, having distant learning using mobile technology that can operate without constant Internet access might be the best way to go about it given the present circumstances.

In Nepal, we can see that there still is a long way to go in terms of access to computer and good internet connection for the majority, which is more or less the case throughout the region. These are the areas that should be prioritized for improvement in the region if we are to see the full benefits of technology in education flourish in the years to come.

References

- (n.d.). Retrieved June 19, 2019, from <https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx>
- De Corte, E., Verschaffel, L., Entwistle, N., & van Merriënboer, J. (Eds.). (2003). Powerful learning environments: unravelling basic components and dimensions. *Oxford: Pergamon/Elsevier*.
- Education in Nepal. (2019, April 16). Retrieved June 24, 2019, from <https://wenr.wes.org/2018/04/education-in-nepal>
- Gautam, A., Bortz, W. E. W., & Tatar, D. (2017, November). Case for Integrating Computational Thinking and Science in a Low-Resource Setting. In *Proceedings of the Ninth International Conference on Information and Communication Technologies and Development* (p. 36). ACM.
- Government expenditure on education, total (% of GDP). (n.d.). Retrieved June 27, 2019, from <https://data.worldbank.org/indicator/SE.XPD.TOTL.GD.ZS>
- Households w/ personal computer, %. (n.d.). Retrieved June 19, 2019, from https://todata360.worldbank.org/indicators/entrp.household.computer?country=BRA&indicator=3427&viz=line_chart&years=2012,2016
- Individuals using the Internet (% of population). (n.d.). Retrieved June 19, 2019, from <https://data.worldbank.org/indicator/IT.NET.USER.ZS>
- Khan, M., Hossain, S., Hasan, M., & Clement, C. K. (2012). Barriers to the introduction of ICT into education in developing countries: The example of Bangladesh. *Online Submission*, 5(2), 61-80.
- Mainali, B. R., & Key, M. B. (2012). Using dynamic geometry software GeoGebra in developing countries: A case study of impressions of mathematics teachers in Nepal. *International Journal for Mathematics Teaching & Learning*.
- Pajo, K., & Wallace, C. (2001). Barriers to the uptake of web-based technology by university teachers. *Journal of Distance Education*, 16, 70–84.
- Pangeni, S. K. (2016). Open and distance learning: Cultural practices in Nepal. *European Journal of Open, Distance and E-learning*, 19(2), 32-45.
- Parajuli, D. R., & Das, T. (2013). Performance of community schools in Nepal: A macro level analysis. *International Journal of Scientific and Technology Research*, 2(7), 148-154.
- Pulkkinen, J. (2007). Cultural globalization and integration of ICT in education. In K. Kumpulainen (Ed.), *Educational technology: Opportunities and challenges* (pp. 13–23). Oulu, Finland: University of Oulu.
- Shields, R. (2011). ICT or I see tea? Modernity, technology and education in Nepal. *Globalisation, Societies and Education*, 9(1), 85-97.
- Thapa, A. (2013). Does private school competition improve public school performance? The case of Nepal. *International Journal of Educational Development*, 33(4), 358-366.
- Tsai, C. C., & Chai, C. S. (2012). The “third”–order barrier for technology-integration instruction: Implications for teacher education. *Australasian Journal of Educational Technology*.

Volman, M., & Van Eck, E. (2001). Gender Equity and Information Technology in Education: The Second Decade. *Review of Educational Research*, 71(4), 613–634.

Wood, D. (1995). Theory, training, and technology: Part I. *Education and Training*, 37(1), 12–16.

Zhao, Y., Lei, J., & Conway, P. F. (2006). Global perspective on political definitions of e-learning: commonalities and differences in national educational technology strategy discourses. In *The international handbook of virtual learning environments* (pp. 673-697). Springer, Dordrecht.

김윤선. (2016). Information Communication Technology Development in Nepal. *지역발전연구*, 25, 101-141.