

## Integration of Information and Communication Technology in Education: The Opportunities and Challenges

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### Article History

Received  
12<sup>th</sup> March, 2022

Revised  
14<sup>th</sup> May, 2022

Accepted  
16<sup>th</sup> June, 2022

### Abstract

*This paper examines the integration of information and communication technology (ICT) in education with its challenges and opportunities. Particularly, it aims to explore how the integration of information and communication technology and tools in education have created the opportunities and challenges to teachers, students, and even to educational institutions. I reviewed books, journals and research articles to examine the integration of ICT in education, the opportunities and challenges of implementing ICT in education and some ways to mitigate these challenges. From the review of various sources, I found the growing use of ICT in education sector creating both opportunities as well as challenges. The study revealed that the integration of ICT in education has been prioritised by many countries in the world. This study also showed the necessity of integrating ICT in education system to replace the traditional pedagogy and offer relevant knowledge and skills to both students and teacher to better survive in contemporary information society. This study suggests to redesign the educational infrastructure, teacher training, curriculum structures and materials, classroom practices and modes of assessment at all levels to integrate and implement ICT in education system effectively.*

**Keywords:** information and communication technology, ICT tools, integration, pedagogy

### Introduction

Almost all sectors of contemporary society have been highly influenced by the information and communication technology (ICT). Information and communication technologies have been vehicle for social transformation. Kirkwood (2014) argues that ICT is involved in societal changes throughout the world; particularly mobile phones, internet and social media have been connected with vital social changes over the last 15–20 years. The integration of ICT into

different sectors have altered ways of living too. Roztocki et al. (2019) argue that information and communication technologies (ICTs) have altered the way of communicating with each other, finding information, working, running business, interacting with government agencies, and managing social lives.

Like other sectors, the education sector has also been highly influenced by the development of information and communication technologies. These technologies and tools are powerful for the transformation of traditional pedagogy. Aduwa-Ogiegbaen and Iyamu (2005) point out the necessity of ICT in education in the era of globalization where the global dissemination of knowledge and information have been in the access of everyone via satellite and the internet. So, the ICTs have had significant impacts on many sectors in today's knowledge economy world (Lim et al., 2020). Although information and communication technology and tools have offered a lot of advantages to students, teachers, educators or even to educational institutions, these technologies and tools are not free of criticism and also have posed challenges too. Keengwe et al. (2008) argue that technology presents educators with challenges and opportunities to educate students to their highest potential. Similarly, Livingstone (2012) states, as ICTs bring together traditionally separated educational technologies-books, writing, telephone, television, photography, and also intersect places of learning-home, school, work and community, these changes pose both opportunities and challenges to educational institutions.

### **Rational of the Study**

Integration of ICT in education has shifted pedagogy. Although the use of ICT in Education has offered many opportunities to both teachers and students, its use is not free of challenges. I also experienced that there came challenges as well as opportunity while using ICT in my classroom teaching. This context provided me an insight to carry out this study by reviewing different articles, books, and other documents. I believe this study explores how the integration of ICT in education is both challenge and opportunity in the context of Nepal.

This study provides an insight to the teachers and students to make proper use of ICT to transform the challenges into opportunities and make effective use of ICT in teaching learning process. Even the curriculum designer, textbook writer and others concerned in field of education gain insights on how integration of ICT has created opportunities as well as challenges in the context of Nepal and how such challenges can be mitigated to integrate ICT in education from this study. Such insights provide those ideas on how to develop and implement ICT friendly curriculum and resource materials to transform traditional pedagogy and make teaching-learning process effective.

### **Purpose of the Study**

Teachers, students, curriculum designer, policy makers and even educational institutions take integration of ICT as both an opportunity as well as challenge. In this context, the purpose of this study was to explore how the integration of ICTs in education is an opportunity as well as challenge in the context of Nepal.

## Method

To explore how ICT integration in Education is challenge as well as opportunity in the context of Nepal, I reviewed different books, journals and research article under different themes. I have reviewed different literatures from national as well as from international contexts and discussed the issues in detail within the themes. The conclusion has been derived from the discussion of issue being based on different themes. The following themes explore the context of ICT integration in education in general, how such integration has been opportunities and challenges in the context of Nepal and the possible ways to mitigate such challenges to integrate ICT in education.

## Analysis and Discussion

Based on secondary resources, this section presents how ICT integration in education is both challenge and opportunity in Nepal.

### Integration of ICT in Education

Information and communication technologies have been widely adopted in education for decades. In fact, computer applications in teaching and learning can be traced back to the early 1970s (Levy, 1997). The growing application of ICT in education sector has brought many changes. Hernandez (2017) argues that ICT has had a massive and multiplying effects in education as it has brought about major changes in terms of form and content of education worldwide. So, many countries in the world have prioritized the application of ICTs in education. Pelgrum (2001) states that many governments developed plans to increase their funds to implement ICT in education in the late 1990s. ICT involves different terms when it is connected with education. Khan et al. (2012) state that the term ICT as applied to education involve technologies such as computers, the internet, broadcasting technologies and telephone that can facilitate not only delivery of instruction, but also learning processes itself. The integration of ICT in education is not limited within the use of certain tools in the classroom that foster learning environment, rather it involves a shift of traditional pedagogy. The massive use of ICT into different sectors of the knowledge based society has compelled both teacher and students to transform their way of teaching and learning. Hinostroza (2018) claims that the widespread accessibility and use of ICT in society has led teachers and students to use these tools and make teaching and learning process even possible outside the traditional classroom context. The use of ICT has not only transformed the way of teaching, it has also changed the role of students and teachers in teaching and learning process.

Although the integration of ICT in Nepalese education system has short history, the use of ICT in education is increasing surprisingly. Karki (2019) states that although the brief history of ICT in Nepal started with the beginning of telecommunication service in 1913, it got priority in our education policies since last decade. The necessity of such technologies and tools have been realized much in present critical situation than ever before by all people associated in the field of education. Teachers, students and even different schools have used information and

communication technologies and tools as common platform and means of sharing knowledge and skills these days. These tools have offered many opportunities for teachers, students and even to educational institutions.

### **Opportunities of Integrating ICT in Education**

Since the integration of ICT into education, it has brought many opportunities to both developing and developed countries. For instance, it has helped in connecting the rural schools to the outside world and more internal and external communication through the internet (O'mahony, 2003). Both teachers and students can share their knowledge and skills with colleagues all over the world using ICT. Kirkwood (2014) argues that ICT can be resources for learning for both teachers and students as it provides them with opportunities for sharing their experiences and updating themselves with the latest informative materials and theoretical improvements in education. Similarly, Pelgrum (2001) states that the use of ICT has shifted learners from the passive consumer of educational offerings to an active knowledge gatherer and creative participant in educational activities. He further argues that ICT is not only the backbone of the information society, but also an important tool for bringing educational reforms that change students into creative knowledge workers. Different tools of ICT such as computer, internet, mobile dictionaries, LCD projectors, DVD players, e-books and e-learning systems introduced and used in many universities and schools all over the world have created a lot of opportunities for all concerned in imparting and gaining education.

Information and communication tools have changed the behavior and nature of education in both developed and developing countries. Azmi (2017) states that the use of ICT in classroom motivates students to continue their learning and stimulate their creativity and passion for learning. Likewise, Dwiono et al. (2018) argue that the integration of ICT in learning is an opportunity to create new learning experiences for students. Integrating ICT in teaching can increase the students' interest and motivation in learning and also supports in good understanding of learning materials. Hu and McGrath (2011) state that the use of technologically enhanced materials and the ICT resources and facilities provide support in autonomous learning of all the learners. The use of ICT in the classroom facilitates teachers to be update with new innovation in teaching and also assist them in delivery of content to the students.

### **Challenges of Implementing ICT in Education**

Although ICT has a great potentiality to reform or even transform education, barriers come in the way of achieving success especially with students' learning. Sutherland et al. (2004) argue that knowing how to use ICT tools to transform learning in schools is not so straightforward as these new ICT tools often challenge an existing practice of teaching and threaten a deep-rooted knowledge domain. The advancement in ICT has affected different sectors of today's information society. Ferreira et al. (2014) argue that the use of new technologies has caused changes in habits, values and traditions and within this context, educational institutions, such as universities, are challenged to follow and adapt new technologies and guarantee their

graduates' excellent professional abilities and performance. O'mahony (2003) has given a long list of challenges in implementing ICT in teaching and learning. These challenges include; insufficient access to ICT facilities, unfavorable ICT policies, lack of technical support, unfavorable appraisal systems related to ICT use, difficulty in changing deep-rooted roles of teachers, schools and students, inappropriate beliefs and attitudes.

Developing and underdeveloped countries have different stories of using ICT to that of developed countries as these countries have a lot of challenges to implement ICT and take its advantages. Developed countries have implemented ICT very much effectively but developing countries are still facing several challenges. For example, Dhital (2018) has reported various challenges of integrating ICT in teaching and learning in the context of Nepal such as lack of access of ICT tools, no access of electricity, lack of technical support, lack of ICT related trainings, lack of infrastructure to integrate ICT and lack of digital resources. In developing countries including Nepal, many teachers are not at access of ICT and those who are in access even can't operate and use them for their maximum benefits. Hinostroza (2018) claims that many students and teachers lack the digital skills needed to make effective use of ICT tools that has created negative consequences for students' learning and also increased educational inequalities especially in developing countries. Khan et al., (2012) state that the lack of technology supportive physical environment in the university and absence of government, as well as institutional preparation to integrate ICT in education, are major problems in the contexts of developing countries.

Although ICT has offered a lot of advantages in the field of education, south Asian countries including Nepal have not gained expected benefits of ICT due to limited access of it. In this regard, Lim et al. (2020) states that although ICT have enhanced equity, quality, and efficiency in the education sector in developing and emerging countries, the adoption of ICT in the South Asian countries' education sector has not been at scale and its impacts have been limited in the field of education. In the Nepalese context, there are many barriers to implement ICT in the classroom. These include lack of web access in most of the rural areas, low level of digital literacy, low income of teachers, subsistence levels of economy in rural communities, and consequent inability to pay for expensive digital technology, as well a lack of government investment in ICT infrastructure in village communities as well as in schools (Rana et al., 2020). The ICT tools have still been beyond the access to many teachers and students and these tools have been practised mainly by educational institutions based in city areas (Acharya, 2014). Moreover, many teachers are not making proper use of ICT even if they have access of it due to insufficient ICT skills. Rana and Rana (2020) point out teachers' low level of ICT knowledge and skills as barriers to effective use of available ICT tools. All the above discussed literature indicates that although the integration of ICT in education helps both teachers and students to make their teaching learning more interactive and motivating, there exists many barriers in the way to implement ICT integrated teaching-learning in the context of Nepal. These barriers need to be mitigated to integrate ICT in education and gain maximum benefit of it.

## **Mitigating Measures and Way Forward**

Although many ICT tools have been invented for teaching learning purpose, their effective use to transform traditional pedagogy is full of challenge. Regarding the ways of mitigating challenges in implementing ICT in education, Khodabandelou et al. (2016) argue that teachers should attend ICT training and be capable of changing their mindset to adapt technology. Similarly, Samuel and Zaitun (2007) have suggested different measures to mitigate the challenges of implementing of ICT in the classroom. These include the full cooperation and support from the school administration, positive attitude of teachers, continuous training to update teachers' ICT skills, training on when, when not and how to use ICT tools appropriately, and the appropriate use of interactive websites, e-mail, discussion boards, courseware in the form of CD-ROMs. Moreover, Livingstone (2012) suggests to redesign the educational infrastructure, teacher training, curriculum structures and materials, classroom practices and modes of assessment at all levels to embed ICT in education and avoid its challenges. In the context of Nepal, Rana and Rana (2020) claim that ICT training is essential for teachers to adopt ICT- based teaching and learning for changing the traditional teaching strategies to modern learning ways.

## **Conclusion**

The information and communication technologies and tools have created both opportunities as well as challenges for teachers, students, curriculum designers, educational planner, and even to educational institutions. The access and availability of information and communication technologies and tools have connected school with outside world and teaching and learning process has even gone beyond the classroom setting. The use of ICT tools in education has facilitated the reformation process of education in terms of both form and content and even the role of teachers and students. The ICT has been the backbone and also an important tool for bringing major educational reforms in current information society. Different ICT tools and technologies have offered a lot of opportunities and also changed nature of education in both developed and developing countries. These ICT tools have not only created opportunities but also, they have posed a lot of challenges as well. On the one hand, the ICT tools are not at access of many teachers, students and even to educational institutions in developing countries like Nepal which has created the challenges such as digital divide among the teachers, the students and even the educational institutions. On the other hand, low level of digital literacy, insufficient access to ICT facilities, unfavorable ICT policies, lack of technical support, unfavorable appraisal systems related to ICT use, difficulty in changing deep-rooted roles of teachers, schools and students and inappropriate beliefs and attitudes are posing the challenges in integration and implementation of ICT in education sector.

Although there is challenge of providing access of ICT and integrating it into educational institutions, we have no option of getting back from the implementation of ICT in education. To mitigate the challenges of providing access of ICT to all and implementing them in teaching and learning effectively, the full cooperation and support from the school administration, positive attitude of teachers, continuous training to update teachers' ICT skills, training on when, when

not and how to use ICT tools appropriately, the appropriate use of interactive websites, e-mail, discussion boards and redesign of educational infrastructure, teacher training, curriculum structures and materials, classroom practices and modes of assessment at all levels are required. In the context of Nepal also these measures are essential to transform all the challenges into opportunities and transform our traditional pedagogy to ICT friendly that fulfill needs of the teachers, students and even the educational institutions of contemporary information society.

### References

- Acharya, C. P. (2014). Use of ICT/web tools in ELT in Nepal. *Journal of NELTA*, 19(1-2), 1-16. <https://doi.org/10.3126/nelta.v19i1-2.12076>
- Aduwa-Ogiegbaen, S. E., & Iyamu, E. O. S. (2005). Using information and communication technology in secondary schools in Nigeria: Problems and prospects. *Journal of educational technology & Society*, 8(1), 104-112. <https://www.jstor.org/stable/pdf/jeductechsoci.8.1.104.pdf>
- Azmi, N. (2017). The benefits of using ICT in the EFL classroom: From perceived utility to potential challenges. *Journal of Educational and Social Research*, 7(1), 111-118. <https://doi.org/http://dx.doi.org/10.5901/jesr.2017.v7n1p111>
- Dhital, H. (2018). Opportunities and challenges to use ICT in government school education of Nepal. *International Journal of Innovative Research in Computer and Communication Engineering*, 6(4), 3215-3220. [https://dlwqtxts1xzle7.cloudfront.net/56438994/Opportunities\\_and\\_challenges\\_to\\_use\\_ICT\\_in\\_government\\_school\\_education\\_of\\_Nepal-with-cover-page-v2.pdf?](https://dlwqtxts1xzle7.cloudfront.net/56438994/Opportunities_and_challenges_to_use_ICT_in_government_school_education_of_Nepal-with-cover-page-v2.pdf?)
- Dwiono, R., Rochsantiningsih, D., & Suparno, S. (2018). The teacher's problems on integrating information and communication technology (ICT) in the English language teaching. *International Summit on Science Technology and Humanity*, 1, 1-8.
- Ferreira, N. S., Haddad, M., & Faria, A. A. (2014). Educational technology and educational management in the higher education: New ways of forming professionals. *Open Journal of Social Sciences*, 2(02), 7-11. <https://doi.org/10.4236/jss.2014.22002>
- Hernandez, R. M. (2017). Impact of ICT on Education: Challenges and Perspectives. *Journal of Educational Psychology-Propositos y Representaciones*, 5(1), 337-347. <https://doi.org/10.20511/pyr2017.v5n1.149>
- Hinostroza, J. E. (2018). New challenges for ICT in education policies in developing countries: The need to account for the widespread use of ICT for teaching and learning outside the school. In *ICT-Supported innovations in small countries and developing regions* (pp. 99-119). Springer.
- Hu, Z., & McGrath, I. (2011). Innovation in higher education in China: Are teachers ready to integrate ICT in English language teaching? *Technology, Pedagogy and Education*, 20(1), 41-59. <https://doi.org/10.1080/1475939X.2011.554014>
- Karki, H. (2019). A brief history of public education, information & communication technology (ICT) and ICT in public education in Nepal. *Deerwalk Journal of Computer Science and Information Technology*, 78-103.

- Keengwe, J., Onchwari, G., & Wachira, P. (2008). Computer technology integration and student learning: Barriers and promise. *Journal of Science Education and Technology*, 17(6), 560-565. <https://doi.org/10.1007/s10956-008-9123-5>
- 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.
- Khodabandelou, R., That, J. E. M., Anne, A., & P S, S. (2016). Exploring the main barriers of technology integration in the English language teaching classroom: A qualitative study. *International Journal of Education and Literacy Studies*, 4(1), 53-58.
- Kirkwood, A. (2014, 2014/09/02). Teaching and learning with technology in higher education: blended and distance education needs 'joined-up thinking' rather than technological determinism. *Open Learning: The Journal of Open, Distance and e-Learning*, 29(3), 206-221. <https://doi.org/10.1080/02680513.2015.1009884>
- Levy, M. (1997). *Computer-assisted language learning: Context and conceptualization*. Oxford University Press.
- Lim, C. P., Ra, S., Chin, B., & Wang, T. (2020). Leveraging information and communication technologies (ICT) to enhance education equity, quality, and efficiency: Case studies of Bangladesh and Nepal. *Educational Media International*, 57(2), 87-111. <https://doi.org/10.1080/09523987.2020.1786774>
- Livingstone, S. (2012). Critical reflections on the benefits of ICT in education. *Oxford Review of Education*, 38(1), 9-24. <https://doi.org/10.1080/03054985.2011.577938>
- O'mahony, C. (2003). Getting the information and communications technology formula right: Access+ ability= confident use. *Technology, Pedagogy and Education*, 12(2), 295-311.
- Pelgrum, W. J. (2001). Obstacles to the integration of ICT in education: results from a worldwide educational assessment. *Computers & Education*, 37(2), 163-178. [https://doi.org/10.1016/S0360-1315\(01\)00045-8](https://doi.org/10.1016/S0360-1315(01)00045-8)
- Rana, K., Greenwood, J., & Fox-Turnbull, W. (2020). Implementation of Nepal's education policy in ICT: Examining current practice through an ecological model. *The Electronic Journal of Information Systems in Developing Countries*, 86(2), e12118. <https://doi.org/10.1002/isd2.12118>
- Rana, K., & Rana, K. (2020). ICT integration in teaching and learning activities in higher education: A case study of Nepal's teacher education. *Malaysian Online Journal of Educational Technology*, 8(1), 36-47. <https://doi.org/10.17220/mojet.2020.01.003>
- Roztock, N., Soja, P., & Weistroffer, H. R. (2019). The role of information and communication technologies in socioeconomic development: Towards a multi-dimensional framework. *Information Technology for Development*, 25(2), 171-183. <https://doi.org/10.1080/02681102.2019.1596654>
- Samuel, R. J., & Zaitun, A. (2007). Do teachers have adequate ICT resources and the right ICT skills in integrating ICT tools in the teaching and learning of english language in malaysian schools? *The Electronic Journal of Information Systems in Developing Countries*, 29(1), 1-15. <https://doi.org/10.1002/j.1681-4835.2007.tb00196.x>

Sutherland, R., Armstrong, V., Barnes, S., Brawn, R., Breeze, N., Gall, M., Matthewman, S., Olivero, F., Taylor, A., & Triggs, P. (2004). Transforming teaching and learning: Embedding ICT into everyday classroom practices. *Journal of Computer Assisted Learning*, 20(6), 413-425. <https://doi.org/10.1111/j.1365-2729.2004.00104.x>