

Exploring the Role of Information and Communication Technology for Pedagogical Practices in Higher Education: Case of Ethiopia

Amanuel Ayde Ergado
Jimma University, Ethiopia

ABSTRACT

ICT is a key role player in higher education institutions for pedagogical practices. This paper is aimed at exploring the role of ICT in the Ethiopian higher education system. In the Ethiopian Higher Education system there are movements to integrate ICT into teaching and learning practices. However, the implementation is inadequate. Factors like limited infrastructure, user's attitude towards ICT, management support, skilled human resources and policy issues supporting ICT integration are affecting the implementation of ICT in Ethiopian higher education. To explore the role of ICT in the higher education system of Ethiopia, the researcher reviewed the literature and interviewed professionals from the Ministry of Education and the Ministry of Science and Technology. The findings of the study indicated the lack of an ICT policy for pedagogical practices as the main challenge to the integration of ICT in teaching and learning. Further, lack of support from top management, implementation problems, lack of training for instructors and experts, the structure of ICT service under the administrative unit, and student's skill to use ICT for their learning are considered as the critical problems impacting the integration of ICT for pedagogical practices.

Keywords: *ICT; pedagogical practices; higher education in Ethiopia; ICT for education; teaching-learning*

INTRODUCTION

The main aim of this paper is to explore the role of ICT in pedagogical practices of Ethiopian higher education institutions. In the area of ICT and education, or ICT for education, various reviews have been conducted. However, this paper is intended to review the epistemological studies conducted by employing a qualitative case study design.

The importance of ICT for pedagogical practices in the education system is known. In that regard this study on the role of ICT for pedagogical practices in Ethiopian higher learning institutions is focused on the following: the role of ICT in higher learning institutions of Ethiopia for pedagogical practices; the problems affecting the integration of ICT in teaching and learning practices; the method applied by higher learning institutions to cope with the changing nature of ICT in teaching and learning environment; and the encouraging and discouraging factors affecting the implementation of ICT for pedagogical practices in Ethiopian higher learning institutions.

In this paper we review the concepts of ICT and its role and discuss the interview responses of the professional staff at the Ministry of Education and the Ministry of Science and Technology.

ICT AND ITS ROLE

Information and Communication Technology (ICT) is a general term including different technological materials and resources used for communication, creation, organization, storage, dissemination, utilization and management of information or knowledge (Meenakshi, 2013). Similarly, Sarkar (2012) states ICTs are varied collections of tools and resources used to generate, distribute, communicate and administer information.

ICT has changed every aspect of human endeavor and a crucial role player in human life (Pegu, 2014; Kaur, 2015). According to Berisha-Shaqiri (2015), ICT plays a huge role in the reduction of management expense for business or other sectors, makes communication easier, and supports knowledge transfer, sharing and knowledge management in general. Overall ICT is crucial for quality of management in business, education, social and political aspects of human endeavor (Pegu, 2014; Berisha-Shaqiri, 2015). In response to the question: 'why ICT is used?' Bhasin (2012) notes the role of ICT in education to support the following: students' learning process, the acquisition of the subject matter, achieving the highest skill in teaching and learning and to support the different learning styles of students.

Further, Habib and Ghulan (2017) note the growth of ICT in higher education in the 21st century helps to improve the teaching and learning process in the classroom and facilitate e-learning, which altogether have a positive impact on teaching, learning and research. Habib and Ghulan further note the use of ICT to enhance the learning environment and prepare the youth for their future lives and careers.

ICT and EDUCATION

Kuar (2015) notes that the integration of ICT in education is high on the educational reform agenda and ICT is seen as a vital tool for full participation in the knowledge society. ICT can be applied in different sectors like business, governance, health, education and social services. Equally, ICT plays a greater role in learning/teaching and management of pedagogical practices. It also improves teaching, learning and research activities of higher learning institutions (Meenakshi, 2013). Further, administrative issues, finance, equal distribution of ICT resources and sustainability are the core points to be considered in the integration of ICT into education (Sarkar, 2012).

Meenakshi (2013) explains the benefit of ICT in teaching and learning from the perspective of teachers and notes the reluctance of teachers to use ICTs, especially computers and the Internet. Some of the reasons for this reluctance include: poor software design; skepticism about the effectiveness of computers in improving learning outcomes; lack of administrative support; increased time and effort needed to learn the technology and how to use it for teaching; and, the fear of losing authority in the classroom as it becomes more learner-centered.

ICT has been used as a tool for the development process in the world for the last two decades. According to Dessalegn and Dagmawi (2013), developed countries integrated ICT in their education system and benefited, unlike developing and underdeveloped countries such as Ethiopia. Ndwiki and Thinguri (2017) in a study on the impact of ICT on teaching and learning, note the role of ICT as the major player for quality education in 21st century, and its positive role in teaching-learning and research activities. The integration of technology (that is, ICT) in education, supports learning through different teaching-learning modes, student centered learning and provides various teaching and learning options for educators (Ertmer et al., 2012).

A framework developed by Bhasin (2012) indicates the requirements to use ICT for education effectively. According to the researcher, investing in the hardware, infrastructure, software, services, professional development (human ware), planning, implementation and management are the core points to effectively and efficiently use ICT to improve pedagogical practices. Equally, applying technology in education is important in the key subject matter areas such as mathematics and science when working to achieve integration, largely because educators are not using it for teaching-learning as required for quality of education (Bhasin, 2012).

ICT (that is, computers and Internet) has a role in education sector improvement. Mtebe and Raphael (2017) note that the availability of computers and Internet technology, when used to create

awareness about modern teaching/learning processes through e-learning, brought improvement in the area of course delivery. It is also created an opportunity for international collaboration in teaching and learning among institutes and the sharing of experiences. Furthermore, accessibility for learning was created by using ICT in teaching and learning.

ICT in HIGHER EDUCATION

The growth of higher education has been fast in recent years in an effort to achieve quality education in the society. This growth has been supported by advancements in ICT to match the changes taking place globally (Mondal and Mete, 2012). Mondale and Mete further note the potential of ICTs as powerful tools for the diffusion of knowledge and information.

Implementation of ICT in the higher education system is a basis for change across all levels of the education system. Further, integrating technology in industries, information access, pedagogy, management, research and innovation are dependent on ICT use, requiring professionals with ICT skill from higher education (Alam, 2016).

The report of the RUFORUM AGM (RUFORUM AGM Digest 2017) indicated that the integration of ICT into higher education systems in Africa is in progress. At present, computer technologies, Internet, television and other technologies supporting teaching and learning are in use in African universities. The reasons for the integration of ICT into African higher learning institutions include the sharing of educational resources, accessibility for teaching and learning resources and enhancing capacity of the learners and teachers. Meenakshi (2013) identified the following aims for the integration of ICT into teaching and learning: to support lifelong learning, to improve teaching and learning methods, to provide education for all without exclusion, to share educational resources, and to provide options for learners and teachers.

As discussed by the authors indicated above, there are many ICT related technologies for teaching and learning but computer technologies and Internet are the main ones for teaching and learning in higher learning institutions. These technologies support the education system for the implementation of lifelong learning with advanced pedagogical methodologies, unlike the traditional chalk and board teaching method. Further, the technological advancements used in education provision allows the students to get the required knowledge where and when they want in the absence of teachers and to be creative and innovative (Meenakshi, 2013; RUFORUM AGM Digest, 2017).

However, UNESCO (2005) note the following factors to be considered when integrating ICT into Education:

- The education policy of the country should support ICT integration into the higher education system.
- Educating the learners and teachers on how to use ICT in teaching and learning prior to the integration of ICT into education.
- The content of teaching-learning materials should be designed in a way that is suitable for the integration of ICT for course delivery.
- Awareness about ICT application in education for the general community is required because the learners and teachers are from the community.
- A measurement mechanism is required to check the impact of ICT in pedagogical practices in higher education.
- Conducting research to identify the impact of ICT in education and sharing the results with the required bodies to ensure the achievements.

Consideration of the above factors is expected to facilitate the effective integration of ICT into the higher education system. On the other hand, the challenges affecting the integration of ICT into education system are evident (Ramorola, 2013; Mathevula and Uwizeyimana, 2014; Salehi, H. and Salehi, Z., 2012; Mulhim, 2014; Johnson et al., 2015; Tongkaw, 2013; Pima and Mtui, 2017). According to these authors the main factors affecting the implementation of ICT into education system are as follows:

- Lack of ICT regulation for integrating ICT into education.
- Infrastructural development problems in most developing countries.
- Lack of expert support to resolve technical problems faced when integrating ICT.
- Shortage of technological resources and access to pedagogical practices.
- Lack of effective training to equip students and teachers to be confident in using ICT resources in teaching and learning.
- The teachers are allotted with so many credit hours, therefore, there is limited time to integrate ICT in their teaching and learning.
- The deep rooted traditional teaching methodology
- Implementing ICT in education without considering the interest of students and teachers
- Poor content quality of the teaching materials.
- Imposing the technology from top down without involving the academic staff.

Pima and Mtui (2017) noted five main challenges affecting the use of ICT in education by lecturers in higher education systems. The challenges pointed out by the authors are lack of ICT infrastructure, guiding principles on how to integrate ICT into education, Internet connectivity, awareness about the capacity of ICT in teaching and learning, and participation of stakeholders in ICT for education projects.

ICT in ETHIOPIAN HIGHER EDUCATION

The Ethiopian five year education sector development plan (ESDP V (2015/16-2020)) set the goal for higher learning institutions to train and produce capable students having skills, understanding and approaches in different fields to support the development of the nation (Ministry of Education 2015). The achievement of this goal requires more advanced training, teaching and learning activities as opposed to the more traditional ways of teaching (that is, teacher centered). Instead, integration of ICT into teaching and learning/pedagogy is required to achieve the goals if the Ministry of Education (Ministry of Education, 2015). Nowadays, ICT in Ethiopia is at early stages of development and communities living in rural areas lack ICT infrastructure to access required information (Alemu, 2017).

Hare (2007) in a survey of ICT and Education in Africa, noted that higher learning institutions in Ethiopia have a limited number of computers which are not connected to Internet for teaching and learning purposes. However, Alemu (2007) suggested that the learners and teachers in higher learning institutions or education systems should use ICT in their teaching and learning practice, otherwise, education cannot achieve its objective without using ICT.

A report by World Bank in 2003 stated that ICT has the power to boost the accessibility of quality teaching and learning resources through interaction and international reach. It provides a suitable environment for sharing information, resources and stored records rapidly, and at a low cost without considering distances between locations (World Bank, 2003). On the other hand, UNESCO (2016) noted that the integration of ICT in education is low priority in many of the world's least developed economies. UNESCO (2016) notes this in regard to other objectives, such as decreasing the number of children who are not in school, improving grade progression, and ensuring an adequate

supply of trained teachers are available. In addition, the relatively slow pace of ICT integration can be attributed to factors that are beyond the lack of formal policy. These include inadequate financial resources, curricular reform, physical infrastructure, and the availability of trained teachers with appropriate skills; all of which contributes to the lack of urgency to measure and monitor progress.

Integrating ICT in the education sector at different levels is a challenging task and failure to address the obstacles leads to a widening of the gap in knowledge between developed and developing countries. Mikre (2011) and Fathima (2013), note that the same is true in Ethiopia because ICT is not integrated as required, in the higher education or general education systems in Ethiopia.

On the other hand, in the developed world ICT is contributing to the expansion of their business, education, social and other aspects of life but in the developing and underdeveloped countries the benefit of ICT is unknown and/or hardly used (Mansell, 1999). In Ethiopia, a developing country, the integration of ICT in teaching and learning in higher learning institutions is not anywhere near the level of the developed countries, as shown in the findings of the studies cited in this paper. There is a gap suggested for the integration of ICT into higher education pedagogical practices in Ethiopia.

DISCUSSION – INTERVIEWS WITH MINISTRY ADMINISTRATORS

Directors of ICT and ICT professionals working in the Ministry of Education and the Ministry of Science and Technology were interviewed. The focus of the interview and a discussion of the findings are indicated below.

Ministry of Science and Technology

The interviews focused on the following areas:

- Using ICT in public universities to allow students and teachers to more easily teach or learn in simple way in contrast to the traditional teaching and learning process.
- Use of ICT tools for teaching and learning in universities provide room for virtual learning for students by controlling the activities of teaching and learning centrally.
- ICT tools allow for cost, energy, time and resources to be used effectively and efficiently.
- ICT supported teaching-learning helps to effectively use the human resource and the technological tools existing in higher learning institutions in Ethiopia.
- There are problems affecting the use of technology for teaching and learning in public universities.

Interviewee responses indicate that they are eager to bring the technology/ICT tools to the public universities but they recognize that usage is limited. One interviewee noted the following:

“...the individuals working in the universities or other institutions are not ready to accept the new technology instead they stick to the traditional methods they are familiar with”

The main factors that were noted as affecting the use of ICT in public universities in Ethiopia or other developing countries is fear of technology, lack of trust on the technologies, loss of control/power. To cope up with the changing nature of ICT in the teaching and learning environment the participants suggested that organizing training and sharing experiences that demonstrate the real implementation of technologies would be useful. Some examples provided included: Digital Door lock system in the Ministry of Science and Technology and the digital attendance system. The ICT Director suggested showing the proof of the system functionality, by inviting workers to the workshops before ICT implementation in public universities. Using this approach will allow for testing of the ICT functionality with the professionals who developed it and encouraging the users by providing incentives and other benefits in the universities.

For the purpose of engaging the users to use the ICT tools available in the universities for teaching and learning the ICT Director noted there is a plan in place for “*showing the benefits of ICT tools and the negative aspects of the traditional tools/methods used in higher learning institutions*”.

The Director further noted:

“...In ministry of science technology there is attendance system. Previously there is traditional attendance system. Later we changed to the digital attendance system but the users are not using the new technology. To solve the problem we put the manual attendance and the digital attendance together. For digital attendance we provided more 30 minutes for the users. Latter almost all workers moved to the digital attendance system because there is time benefit.”

This approach provides some kind of incentive for the users to engage them in the use ICT, and can be adapted to assist with integrating ICT in the teaching and learning process.

When using ICT/Technological systems the interviewees noted factors that discourage integration of ICT In teaching and learning. One of the interview responses below illustrates:

“There are two core discouraging factors: Internet problem and System failure. If Internet is not functional due to various reasons the whole system of the organization is not functional. Mean time the customers and the workers will be irritated and dislike the system. They may wish the manual system rather than ICT supported system. On the other hand, the system failure may face the organization. To maintain the system the experts are required. Until its maintenance the function of that organization will be down. Therefore, the users will be discouraged to use the technological system for their activities.”

Ministry of Education

The Director of ICT for higher learning institutions and professionals working in the ICT Section of the Ministry of Education considered the focus areas

Interviewee responses indicate that ICT is an essential element for pedagogical practices in higher learning institutions or the education sector in general. In the case of higher learning institutions it was felt to be more important because the universities are producing skilled human resource for all other sectors contributing for the development of the nation. One interviewee noted as follows:

“Through ICT the teachers can guide their students, provide teaching materials, assess their students and share experience with their colleagues within the country or abroad. They can also use ICT to conduct research to advance their knowledge and innovate something important for the development of the nation”.

The Ministry officials noted that they are working to bring suitable pedagogical practices and research activities into the higher learning institutions. The interviewee responses indicate that the Ministry assesses the existence and implementation of ICT resources in higher learning institutions and the availability of experts to operate those ICT resources installed for academic purposes. Sometimes the universities request the required ICT tools for teaching and learning and they provide it based on their requirements. They may also ask for human resources to operate the ICT tools and the ministry look for professionals for short term or long term recruitment. However the participants noted that the ICT resources in use at the public universities are various but their usage is in question. The participant response below illustrates:

“Because one university may ask one technology for specific purpose but others simply purchase the ICT tool and there is no body to use it. The other challenge for the implementation of ICT tools for public universities is lack experts to operate and train the users how to use ICT tools for teaching and learning activities. The other problem is unwillingness to use ICT tools for teaching and learning because they users are comfortable with the tradition teaching and learning methods”.

The participants noted that for improvements at the higher learning institutions the ministry is working on capacity building by offering short term training or long term training within the country or internationally. The ministry also invites the experts from abroad to share their experience with teachers and professionals working in the area of ICT environment for pedagogical activities. There is also a plan to provide training for students and teachers on the use of ICT for teaching and learning in higher learning institutions. One participant noted as follows:

“In all universities curriculum there is introduction to computer or information technology but the course is not equipping the students with the practical skill to use ICT for their learning. On the other hand, the teachers are teaching theory not the practice.”

Therefore, the teaching and learning method for courses like Introduction to Computer Science/Information Technology should focus on practice rather than theory.

The factors that discourage and impact the use of ICT for teaching and learning are various. Some of the key factors are listed below:

- The absence of an ICT policy for the implementation and use of ICT tools for pedagogical practices
- Resistance to change taking place in the teaching and learning environment in regard to technology use
- The university structure because ICT is under the administrative wing of the university; to support teaching and learning it should be under the academic wing of the universities.
- The absence of incentives (such as certification, promotion, and payment) for teachers and experts in different forms to encourage them to implement ICT for teaching and learning.
- The teachers are overloaded with different activities in the universities other than teaching. Therefore, there is no time to prepare the material suitable to use ICT for their teaching.
- In some universities the top management are not that much supportive of the implementation of ICT for teaching and learning because they are focusing on administrative issues.
- Training and experience sharing is required to develop the skill of the teachers and experts to use ICT in their teaching. Most of the universities have plans to provide training however, there is lack implementation.

These core points motivated the study and were reinforced following the interviews with the ICT professionals from the Ministry of Education and the Ministry of Science and Technology. The interviews showed that ICT is an important resource for education system development. The related study by Habib and Ghulam (2017) stated that ICT is a very crucial resource for 21st century teaching and learning in higher learning institutions. The authors indicated ICT is used as a motivating factor for teachers and students, enables communication, supports co-operative learning, assists with locating research materials and contributes to the improvement of writing skill. The problems facing the implementation of ICT for pedagogical practices are various. In this paper the policy issues, lack of incentives, lack of management support, lack of training and continuous development for instructors and experts, the ICT administrative structure in universities and know how to access ICT resource were explored as the challenges to use ICT for pedagogical practices.

On the other hand, a study conducted by Alemu (2017) suggested the large class size, low proficiency in using ICT, lack of preparation and lack of training as the key challenges for the integration of ICT in higher learning institutions for pedagogical practices.

CONCLUSION

The results from the interview that explored the role of ICT for pedagogical practices in Ethiopian universities showed that ICT is a very essential element for teaching and learning. However, it was not implemented as required, to improve the pedagogical practices in Ethiopian universities. To improve the use of ICT for pedagogical practices, organizing long/short term training, providing incentives for teachers and experts, implementing an ICT policy for education, and developing a plan for sharing of experiences among educators are suggested.

Further, interviewee participants noted the lack of an ICT policy for pedagogical practices in higher learning institutions in Ethiopia as the main challenge to implementing ICT in teaching and learning. In addition, lack of training for teachers and students, the administrative structure of ICT units in universities and lack of incentives are indicated as some of the critical challenges for the integration of ICT in pedagogical practices of the universities in Ethiopia. The researcher recommends that, the Ministry of Education and the Ministry of Science and Technology focus on alleviating the challenges facing the higher learning institutions to implement ICT into their teaching and learning practices to provide quality education for the development of the nation.

REFERENCES

- Alemu, B. M. (2017). "Transforming educational practices of Ethiopia into development and the knowledge society through information and communication technology." *African Educational Research Journal*, vol.5, no.1, pp.1-17.
- Alemu, B. M. (2015). "Integrating ICT into Teaching-learning Practices: Promise, Challenges and Future Directions of Higher Educational Institutes." *Universal Journal of Educational Research*, vol.3, no.3, pp.170-189. Accessed on 5.7.2018, from <http://www.hrpub.org>.
- Alam, M. (2016). "Use of ICT in Higher Education." *The International Journal of Indian Psychology*, vol.3, no.4, pp.162-171.
- Berisha-Shaqiri, A. (2015). "Information technology and management." *Academic Journal of Business, Administration, Law and Social Science*, vol.1, no.1, pp.166-171. Accessed on 25.9.2018, from www.iipcl.org.
- Bhasin, B. (2012). "Integration of Information and Communication Technologies in Enhancing Teaching and Learning." *Contemporary Educational Technology*, vol.3, no.2, pp.130-140.
- Dessalegn, M., and Dagmawi, L. (2013). "The Promises and Challenges of ICT-Pedagogy Integration in Developing Countries: the Case of Ethiopia." *International Journal of Education*, vol.1, no.7, Accessed on 6.8.2018, from <https://www.internetsociety.org/sites/default/files>.
- Ertmer, P. A., Ottenbreit-Leftwich, A. T., Sadik, O., Sendurur, E., & Sendurur, P. (2012). "Teacher beliefs and technology integration practices: A critical relationship." *Computers & Education*, vol. 59, no.2, pp.423-435.
- Fathima, S. (2013). "Challenges of ICT in Teaching Learning Process." *International Journal of Engineering And Science*, vol. 2, no.12, pp. 51-54,

- Habib, H. and Ghulam B. (2017). "Role of ICT in Higher Education." *International Journal of Creative Research Thoughts (IJCRT)*, Vol. 4, no. 5, pp. 2810-2813, Accessed on 24.2.2019, from <http://ijcrt.org/papers/IJCRT1704371.pdf>
- Hare, H., (2007). ICT in Education in Ethiopia: SURVEY OF ICT AND EDUCATION IN AFRICA: Ethiopia Country Report. Accessed on 27.8.2018, from https://www.infodiv.org/infodiv-files/resource/InfodivDocuments_402.pdf
- Johnson, L., Adams Becker, S., Cummins, M., Estrada, V., and Freeman, A. (2015). NMCTechnology Outlook for Higher Education in Ireland: A Horizon Project Regional Report, Austin, Texas: The New Media Consortium.
- Juma, S. K., Raihan, A. and Clement, C. K., (2016). Role of ICT in Higher Educational Administration Uganda, *World Journal of Educational Research*, vol. 3, no. 1, accessed on 15. 12.2018, from www.scholink.org/ojs/index.php/wjer
- Kaur, N. (2015). "Using ICT in Empowering Teachers for Quality Education." *International Journal of Scientific Research Engineering & Technology (IJSRET)*, Conference Proceeding, 14-15 March, 2015.
- Mathevula, D.M. and Uwizeyimana, E.D. (2014). "The Challenges Facing the Integration of ICT in Teaching and Learning Activities in South African Rural Secondary Schools." *Mediterranean Journal of Social Sciences*, vol.5, no.20, pp.1087-1097.
- Mansell, R. (1999). "Information and communication technologies for development: assessing the potential and the risks." *Telecommunications policy*, vol.23, no.1, pp. 35-50.
- Ministry of Education, (2015). Education Sector Development Program V (ESDP V) 2008 – 2012 E.C. (2015/16 – 2019/20 G.C.), Addis Ababa, Ethiopia.
- Meenakshi. (2013). "Importance of ICT in Education." *IOSR Journal of Research & Method in Education (IOSR-JRME)*, vol.1, no.4, pp.03-08. Accessed on 15.7.2018, from www.iosrjournals.org.
- Mikre, F. (2011). "The Roles of Information Communication Technologies in Education Review Article with Emphasis to the Computer and Internet." *Ethiop. J. Educ. & Sc*, vol.6, no.2, pp.1-17.
- Mulhim, Al.E. (2014). "The Barriers to the Use of ICT in Teaching in Saudi Arabia: A Review of Literature." *Universal Journal of Educational Research*, vol.2, no.6, pp. 487-493.
- Mondal, A. and Mete, J. (2012). "ICT in Higher Education: Opportunities and Challenges." *Bhatter College Journal of Multidisciplinary Studies*, 2(3), 11, Accessed on 13.6.2018, from <http://bcjms.bhattercollege.ac.in>.
- Mtebe, S.J. and Raphael, C. (2017). "A decade of technology enhanced learning at the University of Dar es Salaam, Tanzania: Challenges, achievements, and opportunities." *IJEDICT*, vol.13, no. 2, pp.103-115.
- Ndwiki, J. M. and Thinguri, R. W. (2017). "A Critical Analysis on the Impact of Information and Communication Technology on Teaching and Learning in Kenyan Public Secondary Schools." *European Journal of Education Studies*, vol. 3, no.1, pp.313-324.

- Pegu, K. U. (2014). "Information and Communication Technology in Higher Education in India: Challenges and Opportunities." *International Journal of Information and Computation Technology*, vol. 4 no.5, pp. 513-518. Accessed on 23.7.2018, from <http://www.irphouse.com /ijict.htm>.
- Pima, J. and Mtui, J., (2017). "Investigating the lecturers' challenges to embrace Collaborative WebTechnologies in Higher Education Institutions." *International Journal of Education and Development using Information and Communication Technology*, vol.13, no.3, pp. 80-97.
- Ramorola, M Z. (2013). " Challenge of effective technology integration into teaching and learning." *Africa Education Review*, vol.10, no.4, pp. 654 – 670
- RUFORUM AGM Digest, (2017). The Role of ICT in Africa's Evolving Higher Education Sector. Accessed on 20.9.2018, from <https://blog.ruforum.org/2017/10/24/the-role-of-ict-in-africas-evolving-higher-education-sector/>
- Salehi, H. and Salehi, Z. (2012). "Challenges for Using ICT in Education: Teachers' Insights." *International Journal of e-Education, e-Business, e-Management and e-Learning*, vol.2, no.1, pp.40-43.
- Sarkar, S. (2012). "The role of information and communication technology (ICT) in higher education for the 21st century." *The science probe*, vol.1, no.1, pp. 30-41.
- Tongkaw, A. (2013). Multi perspective integrations Information and Communication Technologies (ICTs) in higher education in developing countries: case study Thailand. *Procedia - Social and Behavioral Sciences*, vol. 93, pp. 1467 – 1472.
- UNESCO. (2016). ICT in education statistics: Shifting from regional reporting to global monitoring: Progress made, challenges encountered, and the way forward. Accessed on 28.6.2018 from <http://unesdoc.unesco.org/images/0024/002455/245572e.pdf>.
- UNESCO. (2005). Information and Communication Technologies in Schools: A HANDBOOK FOR TEACHERS, Division of Higher Education. France.
- World Bank. (2003). ICT and MDGs: a WorldBank Group Perspective (English). "Washington, DC: World Bank. Accessed on 20.9.2018 From <http://documents.worldbank.org/curated/en/538451468762925037/ICT-and-MDGs-a-World-Bank-Group-Perspective>
-

Copyright for articles published in this journal is retained by the authors, with first publication rights granted to the journal. By virtue of their appearance in this open access journal, articles are free to use, with proper attribution, in educational and other non-commercial settings.