PalArch's Journal of Archaeology of Egypt / Egyptology

EXPLORING THE CHALLENGES OF INTEGRATING ICT IN UNIVERSITY-LEVEL CLASSROOMS: A CASE STUDY OF THE INTERNATIONAL ISLAMIC UNIVERSITY

Syed Ghazanfer Abbas[1], Muhammad Ehsan[2], Saeed Khan[3], Saima Shehzad[4], Munira Mehmood[5], Farman Ali Shah[6]

[1,2] PhD Scholar, Faculty of Education, International Islamic University, Islamabad Pakistan

[3] PhD Scholar, Department of Educational Leadership & Management, Qurtuba University, Dera Ismail Khan, Pakistan

[4,6] PhD Scholar, IER Gomal University, Dera Ismail Khan, Pakistan

[5]M.Phil Scholar, IER Gomal University, Dera Ismail Khan, Pakistan

Email: [1]syed.ghazanfer51214@gmail.com [2]ehsankgp@hotmail.com

[3]saeed786333@gmail.com [4]saimasheikh204@gmail.com [5]Muniramehmood437@gmail.com

[6] the.shah315@gmail.com

Syed Ghazanfer Abbas, Muhammad Ehsan, Saeed Khan, Saima Shehzad, Munira Mehmood, Farman Ali Shah. Exploring The Challenges Of Integrating Ict In University-Level Classrooms: A Case Study Of The International Islamic University -- Palarch's Journal Of Archaeology Of Egypt/Egyptology 20(2), 105-121. ISSN 1567-214x

Key Words: Integration, Information And Communication Technology, Teaching, Learning

ABSTRACT

The rapid growth of Information and Communication Technology (ICT) has become one of the most emerging areas discussed by the researchers and the scholars, especially its integration with classroom teaching during the last three decades. The main purpose of this study was to explore the Integration of ICT in the classroom practices. The objective of the study was: to explore the problems to the integration of ICT in the classroom. Population of the study consisted of all teachers (75) during the year 2020-2021 from the Faculty of Social Sciences, International Islamic University Islamabad. Universal sampling technique was used in the selection of sample. Self structured Questionnaire was used a research tool. Data were collected with five-point Likert Scale. The major findings of the study were, Due to shortage of time and huge work load they are not able to feedback timely. There is a variation in the

identification of the problems confronted by teachers during the use of these technologies. Sequence wise problems to uptake ICTs among teachers are; lack of interest, electric fluctuation, High cost prices of the technologies, lack of training, shortage of time, huge work load, and low quality internet connectivity, lack of knowledge. Continuous seminars and workshops for the training of teachers may be developed and launched so that teachers may update them according to the current advances in the field of ICTs.

INTRODUCTION

Information and Communication technology (ICT) is the combination of two term Information technology and Communication technology. In the modern era, ICT is the very essential part of the contemporary world. We live in a period where the improvement is pushing quickly ahead and the standard for young people in the present Western world is to approach a mechanical gadget (Harmer, 2015).

Technology totally changed the life style of every one. ICT energized the brains of educators as well as learners throughout the world as ahead of schedule as the start of the nineteenth century. The motivation behind technology is to expand the personal satisfaction. It develops many problems during its usage. Technology produces information, devices and procedures to tackle these issues (Başer, 2006).

Utilization of technology in instruction gives better learning and encourages basic reasoning. Various methods utilized in instructive technology likewise give a superior learning experience to youngsters (Ismajli, 2008 referred to in Dogan, 2010).

The integration of ICT in education has not just changed the pace of advancement in education field, yet made an extraordinary test to build up a limit with respect to change and "the utilization of ICT in instruction can expand access to learning openings. It can assist with upgrading the nature of instruction with cutting edge showing strategies, improve learning results and empower change or better of educational framework" (UNESCO, 2009). According to Michael (2012), that the fruitful coordination of ICT into the instruction framework has reshaped the procedure of increase and dispersal of information all through the general public.

Under the scenario of Pakistanis Higher Education institutes integrating the ICT for teaching and learning forms, these institutes despite everything face a great deal of issues in attempted such a procedure. Absence of the foundational way to deal with ICT doing. It is significant for all partners in the organization, to know the current ICT speed and outfitted administrations and their significance comparable to their particular undertakings (Tusubira & Mulira, 2004).

Learning is the process through which people and group of people consolidate the data and instruments accessible to them to create significant experiences that make their work and lives simpler and take care of difficulties and problems they face. The expanded limit innovation brings to the arrangement

and the executives of the different components of a framework additionally attempts to improve learning results altogether (Kang, Heo & Kim, 2011).
The success of the technology use in the educational institutes largely depends on teachers attitudes toward technology use. Teachers were less likely to contribute effectively to the utilization of ICT for educational purposes those hold negative attitudes toward the use of ICTs (Al-Zaidiyeen, Mei, & Fool, 2010). The role of teachers is very remarkable during the process of integration of ICT in classroom activities. If the teachers are well informed about the tool of ICT which will used in lesson then the outcomes will be achieved according to desire, and teacher will be able to evaluate their students' abilities. (Lapadat, 2015).

It is very complicated process to integrate the ICT in classroom teaching and one that may encounter a number of difficulties. These difficulties are known as barriers (Schoepp, 2005). Many studies highlighted those barriers such as lack of confidence, lack of effective training in solving technical problems, lack of resources, Insufficient ICT knowledge and skill and insufficient time (Balanskat, 2006). At a broader level, Becta, (2006) stated that the negative attitude of the teachers were the important problem to use new technologies in the field of education.

Newhouse, (2002) stated that many teachers lacked the knowledge and skills to use ICT were not enthusiastic about the changes. Sife, & Sanga, (2007) emphasize that for the integration of ICTs to be effective and sustainable, decision maker themselves must be competent. All stakeholders in the implementation process formally organized awareness platform, visits to similar institution where succeeded has occurred, and short trainings can contribute to raise the awareness and variety the attitude of stakeholders towards facilities and services.

On the issue of technology integration in education, there are considerable disparities between developed and developing countries. Developed countries have more resources, knowledge, skills and experience than developing countries. However, developed nations suffer from many of the same challenges and concerns as developing nations, though to different extents. They suffer from the same concerns of teacher apprehension and motivation, and lack of appropriate educational software and technical support, and the same challenges of providing adequate teacher training, of taking care of infrastructural inadequacies, and implementing learner-centered instruction and proper assessment procedures in universities.

LITERATURE REVIEW

Information & Communication Technologies

ICT is the latest mode of communication that provides the knowledge through digital ways. According to Gull (2020) that ICT is one of the major type of communication which will be found in the process of T&L. Similarly, ICT is the combination of IT and CT and both are used in communication process, that why it has become a very popular in education (Almqvist, 2015).

The knowledge or information gained through the computer based resources including every kind of hardware or software are the part of Information and communication technologies (Unwin, 2009). Stevenson was the first who has reported to UK government in 1997, that every type of information or knowledge can be stored through network computers or other devices. ICTs have changed or revolutionized the every field of the life with its remarkable aspects especially in the field of education (Field, & Fegan, 2005).

ICTs is not only essential tool that can be used for communication with the passage of time new inventions such as social media was also integrate the every life with the whole world (Svensson, 2015). United Nations Educational, Scientific and Cultural Organization (UNESCO) have also stated that ICTs is major supplement that can transfer or enrich education for the betterment of human beings (Ratheeswari, 2018). It is claimed by UNESCO that, with the used of ICT qualitative teaching could be possible as well as maintained the long term suitable progress (UNESCO, 2019).

The term ICT is also used to suggest the meeting place of various media and speech sound arrangements with microcomputers. There are significant motivational forces to connect to the phone that use cabling, flag rotation, and a single board-bound organization with a PC-arranged framework. ICT is a broad subject and ideas are developed (Ratheeswari, 2018).

It is bound to anything that will store, retrieve, control, transmit, or receive data electronically in a high-end structure (such as a PC, computerized Google box, email, or robot). Zuppo, (2012) emphasized that the wide range of ICT, were all the elbow chambers of the progressive system have "common traits" that are identified with the progress that the data has made. "The ideological contradiction between the innovations of post-correspondence and the progress of large-scale correspondence has been identified by the positivist Piyush Maher. A Framework for Capacity Knowledge is one of the many pillars of imaging and overseeing the capabilities of ICT professionals in the 21st century (Zuppo, 2012).

ICTs & Education

Traditional learning changed through ICTs and there is no doubt that the research and teaching and learning is highly flown. It is the potential of ICTs to enrich, deeper skills and also involved the scholars to provide the help in different educational institutions, and also create the financial opportunities for future (Yusuf, 2005).

The universe is change very quickly and the base of fundamental training is the, someone gets data where to apply. Some abilities should be found in ICTs in the whole world. Methodical instruction has highlighted the reading materials were composed by the course. Education has demand through label and introduction can’t break up with material. The starting point of educational module protected and it will be more useful way that how data will be used. Contemporary ICTs provide us the help to

fulfill these essential requirements. There are routine competencies in the world-class setting that are based on the educational modules that use these technologies for potential (Oliver, 2000).

The combination of discriminating information and communication technology helps keep teachers and students alive. This will help enhance the quality of education. We involved the teachers in reciprocal tasks and change the strategy which involved in its development which include in educational partnership with ICTs as an instrument (Ratheeswari, 2018).

Zhao & Cziko (2001) expressed that it is essential for the teachers to present the ICTs in the classroom. Educators should trust in the success of the technology. The believed that it will not cause any problem and at the end educator believed that they can manage technology.
According to Hariss, (2002) research revealed that advantages of ICTs will be increased through the deception of ICTs. He refers that the ICTs will increase the learning and also be useful for the preparation of lives and career for the future generation through the changing of teachers. ICTs can modified the responsibilities and abilities of the future education in which high levels are involved and they can get a lot of help.

Understanding Educational Change & The Implementation Process

Education plays a key role in safeguarding social, economic and political development. However, social legislation and the same level of innovation and requirements change over time and will change in the future. Conditions and requirements play a critical role at all levels for educate the people through it many changes occurred in education. On the other hand, the procedure of educational change take place has changed (Fluck & Dowden, 2010).

John, (2005) explained the important kind of educational change process which is given below; (the interior or inner, the outer and distinctive) -Interior change medium is used in the school at the starting and it promote the outer frame work to hold up and funding; External change provides guidelines for a new national curriculum or state testing system. Individual change refers to individual beliefs and actions that only one person does in the process of change.

In the new millennium, it has been argued, as in the interior and exterior, the individual missions and goals that support the responsibility to change forms should be expanded. Without a complete concept of how internal, external, and individual will interconnect current speculation of change remains immature and permanently underused (Goodson, 2001)

Successful Integration of ICT in Education

According to the point of view of different researchers that ICTs should be integrated in higher education and they also suggested that the Policymakers and teachers can play their roles in this regard. Both teachers and policy makers need to know how education system and technology interrelate with

each other. Many opportunities can be achieved after integration of ICTs in higher education. That's why before implementation of ICT s in higher educational institutions, it is make sure that proper training , good policy, planning as well as reforms in teaching process is necessary, then the educational benefits will achieved. Before implementing the ICTs in educational field, think carefully about the purpose or perception of the education. As usually, it is consider that education is the starter or engine for the improvement and development of culture. Integration is not just tells or inform about knowledge and skills, but it's a way for building human capital and economic growth. Thus, ICTs is simple tool that provide the help to achieve the purpose of education. In instructive settings, this reason will be associated with improved educating and learning for Pupils. ICTs don't in themselves get learners' learning opportunities; however teachers who use ICTs mindfully do. (Krzesłowska, 2006).

Kirkup and Kirkwood, (2005) contend that it is the contextualized educating and learning necessities that should drive the ICTs interventions, instead of the innovation itself. There are many reasons behind the failure of successful integration of ICTs in T&L process, but for most important is the lack of policy and strategies of planning

As indicated by discoveries on their Finnish research dependent on twenty perceptions, and meetings with educators and senior educators, Niemi et al. (2013) distinguish 6 classes of effective ICTs coordination during the time spent T&L. These are given below: "(1) Strategic planning is a part of ICTs (2)Methods for teaching and learning (3) flexibility of curriculums, (4) high interests in correspondence, (5) ideal administration and the executives, and (6) showing staff's solid limit and responsibility."

Challenges Encountered By Teachers When Using ICT in T&L

Ang'ondi (2013) stated that there are many challenges faces by teachers one of the most important was lack of the resources. This was the reason behind that teachers are not able to used ICTs in classroom. Another challenge was noted that teachers have not enough time for practice, sometimes learner wanted to learn ICTs in their leisured.

The experts of ICTs highlighted that the issue of insufficient resources (Tilya, 2007). Furthermore, according to many teachers that they have not enough knowledge about the usage of ICTs in the classroom. It is a common observation from experts that during ICTs training many teachers feel fear on expressing their views and knowledge about the usage of technology. Some teachers said that the short term training was not fulfilling the need of teachers that's why they are not to use ICTs in classroom practices (Ang'ondi, 2013).

Another challenge for teachers is the use of ICT, which is considered a huge burden. These are the teachers who are shown during the teaching courses, get behind the schedule for preparation and neglect to show up completely even once for preparation. Some degree of pressure will not bring them to accept that ICT was a key component while working at the time of instruction. At the

end of training, some teachers used ICTs just for listening or reading the news on internet; some teachers are playing games on machines. Some other teachers are committed to integrating ICT into classroom practices but cannot meet their needs due to lack of administration (Kam, 2007).

Lack of Awareness

In addition, there is a general lack of understanding of the usefulness of ICT in the guidelines, just as there is a general lack of understanding about the ICT available to us and how to obtain and use them financially and appropriately. Lack of intelligence and knowledge about ICT and its use in training, even with regard to management producers, heads and instructors, is particularly difficult to convey to ICT in the field of school training.

Another major problem with the use of ICT in schools is that without the use of new developments, their competence, materiality and various conditions and settings have been overcome. In many nations, especially in the least developed countries, they should take advantage of the competition of others; however, similarly innovation should be used to respond to their own needs and not follow patterns (PWC 2010).

Usage of Internet

The major issue or challenge faced by the teacher as well as learners to adopt the suitable internet facilities. If someone has the internet facility then the other problem will raised that how to monitored the activities of the teachers and students. So, it is necessary to make sure that they don't visit the irrelevant educational and socially undesirable sites (Feuerriegel, 2016).

Monitoring and Evaluation

There are many challenges are interlinked with the integration of ICTs in the education field. Policy maker, educators and other supportive staff are the major participant of this procedure. Monitoring and Evaluation are the main hurdles in this regard. Lack of a set of indicators for ICT in education is another hurdle. The role of ICT is most effective in the field of education, especially in universities. The study found that the use of ICT in teaching and learning is a very new phenomenon. It focuses on academic research and on the other hand also helps in the efficient integration of technology in class practice which is very beneficial for its management (Feuerriegel, 2016).

Methodology / Design of the Study

The study was descriptive in nature and Cross-Sectional survey was used Cross-Sectional survey is the type of observational study that analyzes data from the population at a specific point in time (Lee, James, 1994). The data were collected in order to answer the research questions concerning current status of integration of information, and communication technologies in the classroom at university level. Population was defined for the selection of the sample. Universal sampling technique was used. For this study a questionnaire

was used as a tool. The data were analyzed cumulatively through simple as well as advance statistical formulas.

Population

The study was conducted to explore the problems in the way of integration of ICTs in the classroom at university level according to the teacher perspective. For the purpose of data collection researcher was decided to delimit the population due to lack of time and lack of finance. Therefore, the information was gathered from the teachers of the Faculty of Social Sciences, International Islamic University Islamabad.

Sr. No	Institution	Category	Population
1	IIUI	Teachers	75

Source: https://www.iiu.edu.pk/?page_id=94 Retrieved January, 25, 2020.

Sample and Sampling Techniques

According to Richard & Margaret, (1990) Universal sampling refers to the selection of sample where not all the people in the population have the same profitability of being included in the sample and each one of them, the probability of being selected is unknown. For this study universal sampling technique was used due to the short number of the respondents form the population.

Sr. No	Institution	Category	Sample
1	IIUI	Teachers	75

Source: https://www.iiu.edu.pk/?page_id=94 Retrieved January, 25, 2020.

Findings

On the basis of analysis, these findings were drawn.

1. Majority of the respondents (58.7% & mean score 3.84) agreed that due to lack of hardware, technology is not integrated to the process of teaching and learning.
2. Maximum respondents (46% & mean score 3.70) opined that teachers did not use technology in the teaching and learning process because of their ignorance.
3. Most of the respondents (65.1% & mean score 3.82) agreed that ICTs are not connecting due to continuous power load shedding.
4. A large number of the respondents (54% & mean score 4.05) opined that cost of devices is a major issue not link ICTs with education.

5. Majority of the respondents (38.1% & mean score 3.92) agreed that lack of teacher interest hinders the ICTs approach to teaching.
6. Maximum respondents (69.8% & mean score 3.84) opined that due to lack of training on the use of technology is hinders the teaching of ICTs.
7. Most of the respondents (60.3% & mean score 4.11) agreed that due to high amount of work, teacher have limited time.
8. Comparatively the large number of the respondents (46% & mean score 4.16) opined that a low quality internet connection makes it difficult to find educational content.

DISCUSSION

With regards to teacher attitude towards information and communication technologies, teachers own beliefs and attitude to ICTs and pedagogical innovations are both primary facilitators and barriers to teachers' us of technology in the classroom. (Hennessy, Harrison & Wamakote, 2010).

Huang & Liaw 2005 revealed that teachers attitude towards computer is a key factor in the successful integration of ICTs in the classroom. The participants seemed to have accepted the rationale for using ICTs in teaching and these technologies have the potential to bring improvements in their methodology and the output. However this study revealed that teachers are very competent and their attitudes are very positive. The data indicates that teachers have positive attitude towards these technologies (Huang & Liaw 2005).

Many studies supported the finding of this study and proved that the teachers attitudes toward ICT have significant correlated in the use of these technologies in education. Our respondents are frequent users of this technology. They found that there was a gap between technology coursework and teachers practices. Our teachers indicated lack of training, lack of hardware, lack of interest, shortage of time, power failure as major problems. Teachers were expert in e-mailing and browsing the web (Henry, 2007).

Balanskat, Blamire & Kefala (2006) sported the study, when they revealed that poor ICT skills, low motivation and lack of confidence to use new technologies in teaching are the most important barriers to teachers' ICT usage for instructional purpose. Lack of training; power failure, lack of hardware or expensive hardware, lack of technical support ant shortage of time were the major problems in the use of these technologies. Teachers having little or no confidence in using ICT will try to avoid using these technologies (Abdullah, 2009; Dawes, 2000 & 2001).

CONCLUSIONS

The researcher has drawn the following conclusions in the light of above findings:

1. No doubt that ICT played a very essential role in all the field of life especially in the field of education. In classroom activities ICTs play very supportive role just like reducing the work load, easily access to the content material and other related material, and also a very suitable mode for distance learning. But on the others hand it has many disadvantages, due to heavy

administrative work load, teachers were not able to give the proper feedback to their student's quires. Teachers are skilled to use e-mail for the feedback of students' quires but due to shortage of time and huge work load they are not able to feedback timely.

2. There is a variation in the identification of the problems confronted by teachers during the use of these technologies. Sequence wise problems to uptake ICTs among teachers are; lack of interest, electric fluctuation, High cost prices of the technologies, lack of training, shortage of time, huge work load, and low quality internet connectivity. Due to electric fluctuation, ICTs can't play the effective role in the teaching and learning process.

REFERENCES

Ahlbäck Widenfalk, L., Leinaas, H. P., Bengtsson, J., & Birkemoe, T. (2018). Age and level of self-organization affect the small-scale distribution of springtails (Collembola).

Alev, N. (2003). Integrating information and communications technology (ICT) into pre-service science teacher education*: The challenges of change in a Turkish faculty of education* (Doctoral dissertation).

Al Mulhim, E. (2014). The Barriers to the Use of ICT in Teaching in Saudi Arabia: A Review of Literature. *Universal Journal of Educational Research*, *2*(6), 487 493.

Arkorful, V., & Abaidoo, N. (2015). The role of e-learning, advantages and disadvantages of its adoption in higher education. *International Journal of Instructional Technology and Distance Learning*, *12*(1), 29-42.

Anderson, R. E. (2008). Implications of the information and knowledge society for education. In *International handbook of information technology in primary and secondary education* (pp. 5-22). Springer, Boston, MA.

Anderson, J., Van Weert, T., & Duchâteau, C. (2002). Information and communication technology in education: A curriculum for schools and programme of teacher development.

Ang'ondi, E. K. (2013, July). Teachers Attitudes and perceptions on the use of ICT in teaching and learning as observed by ICT champions. In *Proc. 10th IFIP World Conference on Computers in Education, Torun*.

Angeli, C., & Valanides, N. (2009). Epistemological and methodological issues for the conceptualization, development, and assessment of ICT–TPCK: Advances in technological pedagogical content knowledge (TPCK). *Computers & education*, *52*(1), 154-168.

Atkin, D. (2000). How can I improve my use of ICT? Put history first!. *Teaching History*, 42.

Almqvist ,Wang, Q., Zhang, A. Z, S., Junique, S., Noharet, B., Platt, D., ... & Andersson, J. Y. (2015, March). Recent developments in electroabsorption modulators at Acreo Swedish ICT. In *Terahertz, RF, Millimeter, and Submillimeter-Wave Technology and Applications VIII* (Vol. 9362, p. 93620Z). International Society for Optics and Photonics.

Altun, T. (2007). Information and communications technology (ICT) in initial teacher education: What can Turkey learn from range of international perspectives?. *Journal of Turkish Science Education*, *4*(2), 45-60

Al- Zaidiyeen, N., Mei, L. & Fook, F. (2010). *Teachers' Attitudes and Levels of Technology Use in Classrooms*: A Case of Jordan Schools. International Education Studies. Vol, No. 2, 2010.

Anton, S. R., & Sodano, H. A. (2007). A review of power harvesting using piezoelectric materials (2003 ,2006). *Smart materials and Structures*, *16*(3), R1.

Balanskat, A., Blamire, R., & Kefala, S. (2006). The ICT impact report. *European Schoolnet*, *1*, 1-71.

Bhatt, D., & Maniar, A. (2015). Information and Communication Technology in Higher Education-Help and Challenge. *International Journal of Physical and Social Sciences*, *5*(6), 15-29.

Baser, O. (2006). Too much ado about propensity score models? Comparing methods of propensity score matching. *Value in Health*, *9*(6), 377-385.

Bergmann, K., Branigan, H. P., & Kopp, S. (2015). Exploring the alignment space–lexical and gestural alignment with real and virtual humans. *Frontiers in ICT*, *2*, 7.

Booker, L. C. (2013). *The promised LAN: the transformative power of information and communications technology in developing countries* (Doctoral dissertation).

Behar, A., & Mishra, P. (2015, April). ICTs in schools: Why focusing policy and resources on educators, not children, will improve educational outcomes. World Economic Forum.

Buttar, S. S. (2016). ICT in higher education. *PEOPLE: International Journal of Social Sciences*, *2*(1).

Choline, V. S. (2005), 'Study of the application of information technology for effective access to resources in Indian university libraries', The International Information & Library Review Vol.37, No. (3), 189-197.

Celik, V., & Yesilyurt, E. (2013). Attitudes to technology, perceived computer self-efficacy and computer anxiety as predictors of computer supported education. *Computers & Education*, *60*(1), 148-158.

Chen, W. (2013). School leadership in ICT implementation: Perspectives from Singapore. *The Asia-Pacific Education Researcher*, *22*(3), 301-311.

Cox, M. J., Cox, K., & Preston, C. (2000). What factors support or prevent teachers from using ICT in their classrooms?.

Cartwright, V., & Hammond, M. (2007). 'Fitting it in': A study exploring ICT use in a UK primary school. *Australasian Journal of Educational Technology*, *23*(3).

Dogan, S. (2010). PERCEPTIONS OF TEACHERS ABOUT THE USE OF EDUCATIONAL TECHNOLOGIES IN THE PROCESS OF INSTRUCTION. *Educational Sciences/Odgojne Znanosti*, *12* (2).

Divaharan, S., & Ping, L. C. (2010). Secondary school socio-cultural context influencing ICT integration: A

Ertmer, P. A., & Ottenbreit-Leftwich, A. T. (2010). Teacher technology change: How knowledge, confidence, beliefs, and culture intersect. *Journal of research on Technology in Education*, *42*(3), 255-284.

Field, M.H & Fegan, J., (2005). *Globalization and Across-Borfer Education: Paragigms and Challenges.* In Field, M.H & Fegan, J. (eds.). *Education Across Border: Philosophy, Policy and Pedagogy-New Paradigms and Challenges.* Tokyo; Waseda University Media-Mix Co.Ltd.

Flecknoe, M. (2002).“How can ICT help us to improve education”? Innovations in Education & Teaching International, Vol. 39, No. 4, Pp; 271-280

Fakhru’l-Razi, A., Pendashteh, A., Abdullah, L. C., Biak, D. R. A., Madaeni, S. S., & Abidin, Z. Z. (2009). Review of technologies for oil and gas produced water treatment. *Journal of hazardous materials*, *170*(2-3), 530-551.

Feuerriegel, S., Bodenbenner, P., & Neumann, D. (2016). Value and granularity of ICT and smart meter data in demand response systems. *Energy Economics*, *54*, 1-10.

Figg, C., & Jamani, K. J. (2011). Exploring teacher knowledge and actions supporting technology-enhanced teaching in elementary schools: Two approaches by pre-service teachers. *Australasian journal of educational technology*, *27*(7).

Fluck, A., & Dowden, T. (2010). Can new teachers be ICT change-agents?. In *Proceedings of the International Education Research Conference (AARE 2009)* (pp. 1-10). Australian Association for Research in Education.case study approach. *Australasian Journal of Educational Technology*, *26*(6).

Fitzallen, N. (2004, November). Profiling teachers’ integration of ICT into professional practice. In *Conference proceedings: Australian Association for Research in Education (2004)*.

Gelb, E., Parker, C., Wagner, P., & Rosskopf, K. (2001). Why is the ICT adoption rate by farmers still so slow. *Proceedings ICAST*, *6*, 40-48.

Gay, L. R., Airasian, P. W., & Mills, G. E. (1996). Educational research: Competencies for analysis and application.

Gull, J. (2020). The integration of ICT in ELT: A systematic literature review on the use of Information and Communication Technologies in English language teaching.

Galanouli, D., Murphy, C., & Gardner, J. (2004). Teachers' perceptions of the effectiveness of ICT-competence training. *Computers & Education*, *43*(1-2), 63-79.

Gelb, E., Parker, C., Wagner, P., & Rosskopf, K. (2001). Why is the ICT adoption rate by farmers still so slow. *Proceedings ICAST*, *6*, 40-48.

Hepp, K. P., Hinostroza, S.E., Laval, M.E., Rehbein, L. F. (2004) "Technology in Schools: Education, ICT and the Knowledge Society "OECD. Available:

Hegarty, J. (Ed.). (2004). *ICT and Special Educational Needs*. McGraw-Hill Education (UK).

Hansen, H. R., Mendling, J., & Neumann, G. (2019). *Wirtschaftsinformatik*. Walter de Gruyter GmbH & Co KG.

Hammond, M. (2004). The peculiarities of teaching information and communication technology as a subject: A study of trainee and new ICT teachers in secondary schools. *Technology, pedagogy and education*, *13*(1), 29-42.

Hayes, D. N. (2007). ICT and learning: Lessons from Australian classrooms. *Computers & Education*, *49*(2), 385-395.

Hasselbring, W. (2000). Information system integration. *Communications of the ACM*, *43*(6), 32-38.

Hinostroza, J. E., Labbé, C., Brun, M., & Matamala, C. (2011). Teaching and learning activities in Chilean classrooms: Is ICT making a difference?. *Computers & Education*, *57*(1), 1358-1367.

Harris, S. (2002). Innovative pedagogical practices using ICT in schools in England. *Journal of Computer Assisted Learning*, *18* (4), 449-458.

Hennessy, S., Harrison, D., & Wamakote, L. (2010). Teacher factors influencing classroom use of ICT in Sub-Saharan Africa. *Itupale online journal of African studies*, *2*(1), 39-54.

Huang, H. M., & Liaw, S. S. (2005). Exploring users' attitudes and intentions toward the web as a survey tool. *Computers in human behavior*, *21*(5), 729-743.

Harmer ,Fransen, M., McConnell, S., Harmer, A. R., Van der Esch, M., Simic, M., & Bennell, K. L. (2015). Exercise for osteoarthritis of the knee. *Cochrane database of systematic reviews*, (1).

Hong, K. S., & Songan, P. (2011). ICT in the changing landscape of higher education in Southeast Asia. *Australasian Journal of Educational Technology*, *27*(8).

Kirkup, G., & Kirkwood, A. (2005). Information and communications technologies (ICT) in higher education teaching—a tale of gradualism rather than revolution. *Learning, Media and Technology*, *30* (2), 185-199.

Jimoyiannis, A. (2009). Factors determining teachers' beliefs and perceptions of ICT in education. In *Encyclopedia of information communication technology* (pp. 321-334). IGI Global.

Jegede, P. O., Dibu-Ojerinde, O. O., & Ilori, M. O. (2007). Relationships between ICT competence and attitude among some Nigerian tertiary institution lecturers. *Educational Research and Reviews*, *2*(7), 172-175.

Jenson, M., Myers, M., & Southwood, R. (2004). The impact of ICT in Africa. *Commission for Africa*.

John, P. (2005). The sacred and the profane: subject sub-culture, pedagogical practice and teachers' perceptions of the classroom uses of ICT. *Educational review*, *57*(4), 471-490.

John, P., & Sutherland, R. (2005). Affordance, opportunity and the pedagogical implications of ICT. *Educational Review*, *57*(4), 405-413.

Karagiorgi, Y., & Charalambous, K. (2004). Curricula considerations in ICT integration: Models and practices in Cyprus. *Education and Information Technologies*, *9*(1), 21-35.

Krzesłowska, M., Lenartowska, M., Mellerowicz, E. J., Samardakiewicz, S., & Woźny, A. (2009). Pectinous cell wall thickenings formation—a response of moss protonemata cells to lead. *Environmental and Experimental Botany*, *65*(1), 119-131.

Karagiorgi, Y., & Charalambous, K. (2004). Curricula considerations in ICT integration: Models and practices in Cyprus. *Education and Information Technologies*, *9*(1), 21-35.

Kirkup, G., & Kirkwood, A. (2005). Information and communications technologies (ICT) in higher education teaching—a tale of gradualism rather than revolution. *Learning, media and technology*, *30*(2), 185-199.

Kumar, P., Mathew, L., Shimi, S. L., & Singh, P. (2016). Need of ICT for Sustainable Development of Power Sector. In *Proceedings of International Conference on ICT for Sustainable Development* (pp. 607-614). Springer, Singapore.

Kam, B. L. (2007). Identifying Exemplary Uses of ICT in Mathematics Teaching. *Unpublished Master's Thesis*.

Lee, James (1994). "Odds Ratio or Relative Risk for Cross-Sectional Data? ". International Journal of Epidemiology. 23 (1): 201–3

Littlejohn, A. H. (2002). Improving continuing professional development in the use of ICT. *Journal of computer assisted learning*, *18* (2), 166-174.

Lilja, Y. & Uddgård, A.,(2015). IKT i förskolan:-hur börjar man?.

Lee, J. (1994). Odds ratio or relative risk for cross-sectional data?. *International Journal of Epidemiology*, *23*(1), 201-203.

Leask, M. (Ed.). (2001). *Issues in teaching using ICT*. Psychology Press.

Leye, V. (2007). UNESCO, ICT corporations and the passion of ICT for development: modernization resurrected. *Media, Culture & Society*, *29*(6), 972-993.

Lowe, T., & Humphrey, O. (2018). A Platform for Partnership: A Technology Review of the Padlet sharing platform. *The Journal of Educational Innovation, Partnership and Change*, *4*(1).

Myers, C. B., Bennett, D., Brown, G., & Henderson, T. (2004). Emerging online learning environments and student learning: An analysis of faculty perceptions. *Journal of Educational Technology & Society*, *7* (1), 78-86.

Michael & Hammond,. (2014). Introducing ICT in schools in E ngland: Rationale and consequences. *British Journal of Educational Technology*, *45*(2), 191- 201.

Morris, A. (2011). Student standardised testing.

Miţoch, L. Wikipedia–ICT [online]. 10. 6. 2008, last revised 30. 5. 2010 [cit. 2010- 11-9]. *Dostupné z WWW< http://cs. wikipedia. org/wiki/ICT*.

Moodley, K. (2017). *Mobile learning: a professional teacher technical identity development framework* (Doctoral dissertation, University of Pretoria).

Mozas-Moral, A., Moral-Pajares, E., Medina-Viruel, M. J., & Bernal-Jurado, E. (2016). Manager's educational background and ICT use as

antecedents of export decisions: A crisp set QCA analysis. *Journal of Business Research*, *69*(4), 1333-1335.

Moseley, D., Higgins, S., Bramald, R., Hardman, F., Miller, J., Mroz, M., ... & Halligan, J. (1999). Ways Forward with ICT: Effective Pedagogy Using Information and Communications Technology for Literacy and Numeracy in Primary Schools.

Maddux, C. D. (2014). The Internet: Educational prospects—and problems. *Educational Technology*, *34*(7), 37-42.

Mwalongo, A. (2011). Teachers' perceptions about ICTs for teaching, professional development, administration and personal use. *International Journal of Education and Development using ICT*, *7*(3), 36-49.

Ng'ambi, D., & Johnston, K. (2006). An ICT-mediated Constructivist Approach for increasing academic support and teaching critical thinking skills. *Educational Technology & Society*, *9*(3), 244-253.

Oliver, R., & Towers, S. (2000, December). Benchmarking ICT literacy in tertiary learning settings. In *Learning to choose: Choosing to learn. Proceedings of the 17th Annual ASCILITE Conference* (pp. 381-390).

Oliver, R. (2002). The role of ICT in higher education for the 21st century: ICT as a change agent for education. *Retrieved April*, *14*, 2007.

Ounis, T. (2016). Addressing the integration of ICT into teaching and Identification of the potential factors motivating teachers to use ICT. *International Journal of Humanities and Cultural Studies (IJHCS) ISSN 2356-5926*, *3*(1), 1099-1114.

Prestridge, S. (2010). ICT professional development for teachers in online forums: analyzing the role of discussion. *Teaching and Teacher Education*, *26* (2), 252-258.

Proctor, R. M., Watson, G., & Finger, G. (2003). Measuring information and communication technology (ICT) curriculum integration. *Computers in the Schools*, *20*(4), 67-87.

Peeraer, J., & Van Petegem, P. (2011). ICT in teacher education in an emerging developing country: Vietnam's baseline situation at the start of 'The Year of ICT'. *Computers & Education*, *56*(4), 974-982.

Plowman, L., Stephen, C., & McPake, J. (2010). Supporting young children's learning with technology at home and in preschool. *Research Papers in Education*, *25*(1), 93-113.

Qureshi, I. A., Ilyas, K., Yasmin, R., & Whitty, M. (2012). Challenges of implementing e-learning in a Pakistani university. *Knowledge Management & E-Learning*, *4* (3), 310.

Ratheeswari, K. (2018). Information communication technology in education. *Journal of Applied and Advanced Research*, *3*(1), S45-S47.

Rabah, J. (2015). Benefits and Challenges of Information and Communication Technologies (ICT) Integration in Québec English Schools. *Turkish Online Journal of Educational Technology-TOJET*, *14*(2), 24-31.

Ratheeswari, K. (2018). Information communication technology in education. *Journal of Applied and Advanced Research*, *3*(1), S45-S47.

Sarkar, S. (2012). The role of information and communication technology (ICT) in higher education for the 21st century. *Science*, *1* (1), 30-41.

Sife, A., Lwoga, E., & Sanga, C. (2007). New technologies for teaching and learning: Challenges for higher learning institutions in developing countries. *International journal of education and development using ICT*, *3* (2), 57-67.

Smeets, E. (2005). Does ICT contribute to powerful learning environments in primary education?. *Computers & Education*, *44* (3), 343-355.

Svensson, A. (2015, September). The Teachers' Perspective on School Leadership for ICT. In *European Conference on Knowledge Management* (p. 742). Academic Conferences International Limited.

Sundberg, L. (2017). *Public Values and Decision Making in the Swedish e-Government Context* (Doctoral dissertation, Mid Sweden University).

Schöpper-Grabe ,West, A., Stokes, E., Bäcklund, A. K., Freudendal, M., Meusy, M., Poux, E., & Schöpper-Grabe, S. (2004). ICT learning and training: data, policies and practice in selected EU countries.

Savelyeva, T. (2015). M. Spector, D. Merrill, J. Elen, MJ Bishop (eds): Handbook of research on educational communications and technology.

Smeets, E. (2005). Does ICT contribute to powerful learning environments in primary education?. *Computers & Education*, *44*(3), 343-355.

Shaikh, Z. A., & Khoja, S. A. (2011). Role of ICT in Shaping the Future of Pakistani Higher Education System. *Turkish Online Journal of Educational Technology-TOJET*, *10*(1), 149-161.

UNESCO. (2009). *Guide to measuring information and communication technologies (ICT) in education.* Montreal: UNESCO Institute for Statistics

Tusubira, F., & Mulira, N. (2004, September). Integration of ICT in organizations: Challenges and best practice recommendations based on the experience of Makerere University and other organizations. In *International ICT Conference Held at Hotel Africana, Kampala, Uganda. 5th to 8th September*.

Tezci, E. (2009). Teachers' effect on ICT use in education: The Turkey sample. *Procedia-Social and Behavioral Sciences*, *1*(1), 1285-1294.

Tairo, H. (2017). *Management Perceptions About ICT Integration in Teaching and Learning in Primary Schools in Kinondoni Municipality* (Doctoral dissertation, The Open University of Tanzania).

Tilya, F. (2007). ICT in education in Tanzania: Lessons and experiences from IICD- supported projects. *International Institute for Communication Development, The Hague*.

Tusubira, F., & Mulira, N. (2004, September). Integration of ICT in organizations: Challenges and best practice recommendations based on the experience of Makerere University and other organizations. In *International ICT Conference Held at Hotel Africana, Kampala, Uganda. 5th to 8th September*.

Trushell, J., Byrne, K., & Hassan, N. (2013). ICT facilitated access to information and undergraduates' cheating behaviours. *Computers & Education*, *63*, 151-159.

Unwin, P. T. H., & Unwin, T. (Eds.). (2009). *ICT4D: Information and communication technology for development*. Cambridge University Press.

Woodrow, J. E. (1992). The influence of programming training on the computer literacy and attitudes of preservice teachers. *Journal of research on Computing in Education*, *25* (2), 200-219.

Wheeler, S., Waite, S. J., & Bromfield, C. (2002). Promoting creative thinking through the use of ICT. *Journal of Computer Assisted Learning*, *18* (3), 367-378.

Webster, R., & Oliver, M. A. (1990). *Statistical methods in soil and land resource survey*. Oxford University Press (OUP).

Watson, D. M. (2001). Pedagogy before technology: Re-thinking the relationship between ICT and teaching. *Education and Information technologies*, *6*(4), 251-266.

Wang, Q. (2008). A generic model for guiding the integration of ICT into teaching and learning. *Innovations in education and teaching international*, *45*(4), 411- 419.

Yelland, N (2001), teaching and Learning with information and communication technologies (ICT) for numeracy in the early abildhood and primary years of schooling. Australia: Department of Education, Training and Youth Affairs

Yusuf, M. O. (2005). Information and communication technology and education: Analyzing the Nigerian national policy for information technology. *International education journal*, *6* (3), 316-321.

Yuen, A. H., Law, N., & Wong, K. C. (2003). ICT implementation and school leadership. *Journal of educational Administration*.

Zhao, Y. & Cziko, G. A. (2001). Teacher adoption of technology: a perceptual control theory perspective. Journal of Technology and Teacher Education, Vol. 9, No. (1), Pp; 5-30.

Zuppo, C. M. (2012). Defining ICT in a boundaryless world: The development of a working hierarchy. *International journal of managing information technology*, *4*(3), 13.